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JOURNAL OF ELECTRICITY

POWER AND GAS

Devoted to the Conversion, Transmission and Distribution of Energy

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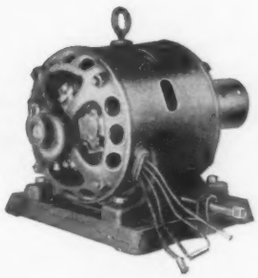
SINGLE  PHASE

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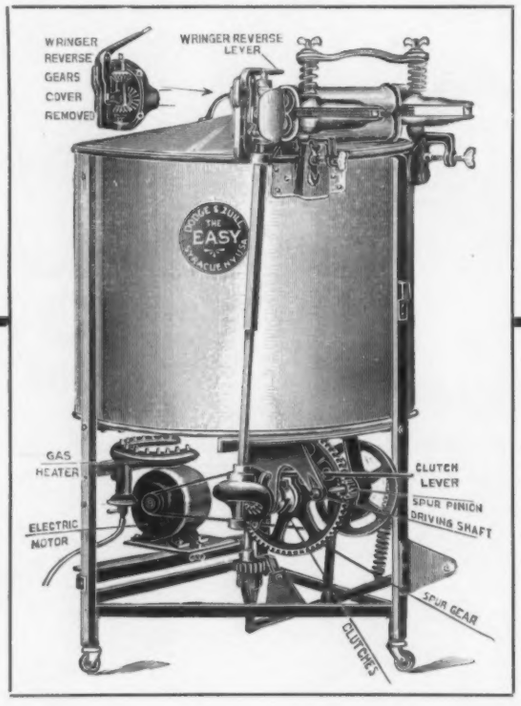
Alphabetical Index to Advertisers, Page 8. Where to Buy It in the West, Pages, 9, 10.



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JOURNAL OF ELECTRICITY
POWER AND GAS
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VOLUME XXX SAN FRANCISCO, JANUARY 25, 1913 NUMBER 4

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A MODERN ELECTRICAL SUPPLY HOUSE

Much interest is attached to the manner in which the electrical needs of a great territory are served, not only in the supply of current, but also in furnishing the apparatus appliances and supplies which utilize that current. The great distributing center of the Pacific States Electric Company recently completed at San Francisco, offers an example of the most modern methods in receiving and distributing electrical appliances and of the application of scientific management to the conduct of a large business. As it embodies the latest ideas and most advanced practice, it seems worthy of the careful investigation given in the following description:

General View of Office Floor With Plate Glass Partitions.

The building, a six-story and basement structure, is situated in the heart of the electrical and mechanical district of the new San Francisco on Mission street, between First and Second, running through to Minna, where all goods are received and dispatched. The exterior finish of light pressed brick with inlays of tile, gives a harmonious tone of gray which is at once unobtrusive and in keeping with this character of mercantile establishment. The exterior, walls, foundations and piers are of brick, laid in rich cement mortar and the floors and columns of mill (or slow burning) construction. Steel is used in the front and rear walls to admit maximum light and avoid heavy piers, the spread of the piers varying from 6 to 7½ ft. square, that of the wall foundations being 4 ft.

Protection against fire has been so carefully planned that this mill type building enjoys one of the

lowest insurance rates on record for such a class of building. The building rate of 0.144 amounts to but $72.00 premium per year on $50,000. In addition to a most complete system of automatic sprinklers, there have been installed hose standards, chemical hand extinguishers, fire buckets, portable fire-resisting excelsior wagons, Pacific auxiliary fire alarm boxes, American District supervising sprinkler alarm and night watchman service, as well as local night watchman registering stations. All exposed steel work is covered with concrete and every architectural precaution has been taken to prevent fire. The automatic sprinkler system has close to 1000 sprinkler heads protecting all areas. These are supplied by a six-inch main line controlled in the basement by main cut-off valve and variable pressure alarm valve. There are also cut-offs and drain valves on each floor. This system has four possible independent sources of water supply, which consist of one 14,000 gallon gravity tank, two pressure tanks each of 5250 gallons capacity, a 3 in. special connection to the Spring Valley Water Company's main and lastly a two-way Siamese steamer connection for the supply of the fire department. The air compressor and feed pump are in the basement together with a 500 gallon surge tank. The system is direct connected with the storm water main so that it can be drained with facility for repairs.

The entrance vestibule on Mission street is marble-lined and provided with two sets of self-closing double acting doors, to keep out the wind and dust and leads directly to a passenger elevator serving the building.

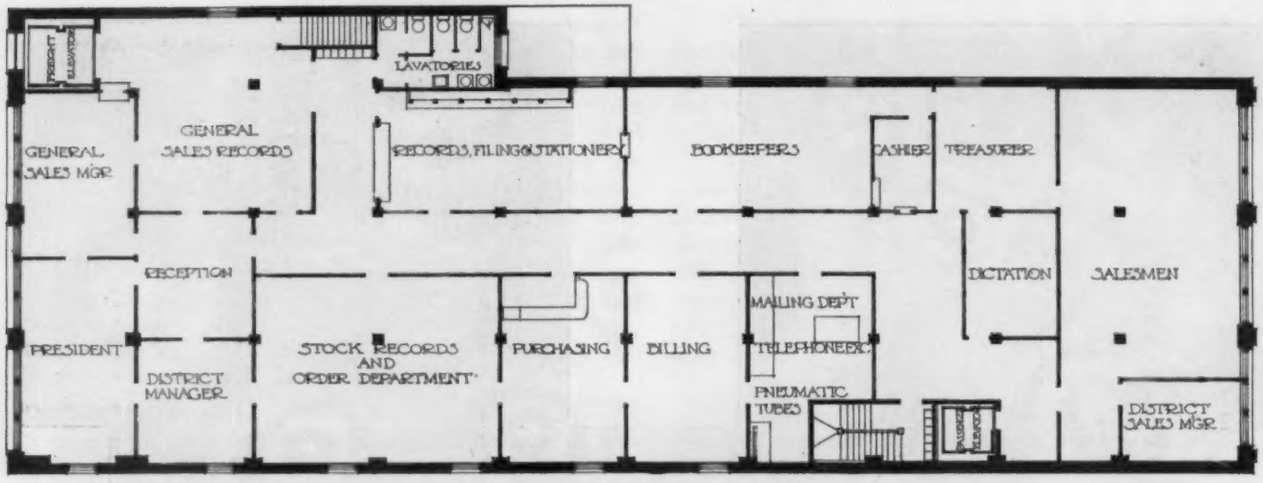
The local salesroom or store is to the right of the main entrance on the first floor. Here is stationed an attendant whose duty it is to direct customers to the several departments, as the policy of the company forbids the use of individual names or titles on doors or desks, the purpose being to accord equal treatment to all. He also has supervision of the counter salesmen and calls reinforcements when necessary.

Local Sales and Display Room on First Floor.

By raising the first story 3 ft. above the street level, the whole store has the effect of a show window, effectively used to display a great variety of electrical household apparatus. By this means, likewise, the receiving and shipping platforms at the rear of the building are thus raised to automobile height for loading and unloading. Further advantages of this innovation include the admission of ample light and ventilation to the basement, a 10 ft. clearance for piling rigid iron conduit, and natural drainage to both ends of the basement in case of flood, as well as raising the floor well above the highest tide water level.

In addition to the usual sales counter, shelving and drawers, the store is furnished with special glass

Executive and General Offices on Fifth Floor.



Plan of Executive and General Offices.

counters to display high grade heating appliances. For expeditiously handling the counter sales, pneumatic tubes are installed to carry orders to the several departments and an electric lift is provided to insure quick delivery from the stock floors to the store.

An attractive illumination has been secured by the use of Veluria Urnolites, a new artistic type of opal glassware, enclosing General Electric Mazda lamps. When cold, these units have the appearance of carved Italian marble. Though less than one watt per square foot is used, the resultant illumination is excellent and of high efficiency.

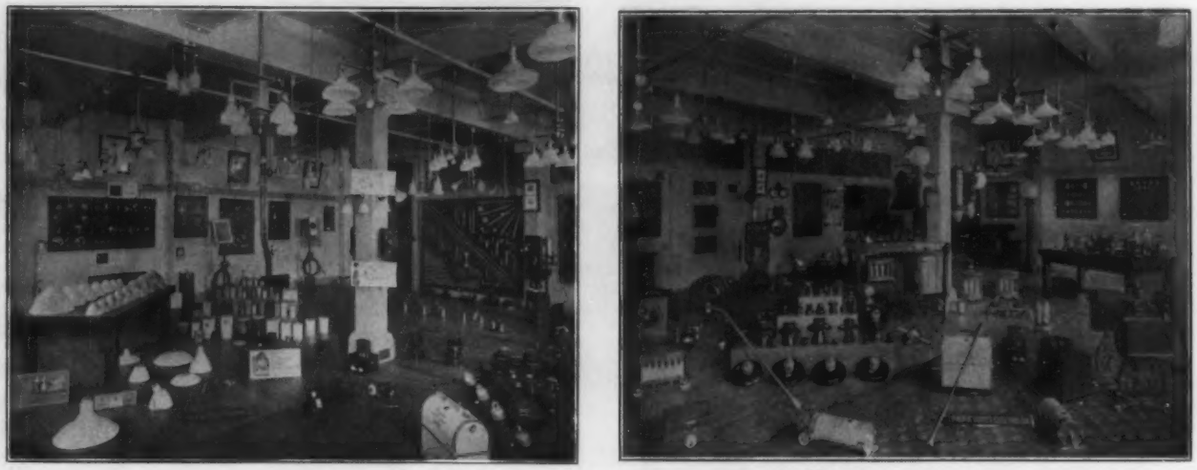
The executive and general offices are on the fifth floor, and embody several unique and distinctive features. The offices and corridors are separated by clear plate glass partitions extending from the ceiling to floor. This, together with the fireproof plate glass windows and light pearl gray wall finish give an abundance of natural light and a most cheerful appearance. This also enables the entire force to be viewed at work from any point on the floor, a feature planned to enlist the confidence of the public.

As the president's office is also used as a directors' meeting room, it alone has been provided with curtains which may be drawn to avoid interruptions during directors' meetings. All doors are equipped with door checks and stops and those leading into hallways have transoms. The cashier's office and the

Girls' Rest Room.
Dining Room.

Sprinkler Tanks.
Building Exterior.

Sun Porch.
Electric Kitchen.



Views of Apparatus, Display Room on Fourth Floor.

filing record and mailing list room are the only ones on this floor equipped with locks. These rooms are provided with counters and through which the employes may receive their information or records. None but those in charge of these departments are allowed to enter. Enclosed cabinets for all boxes, stationery and correspondence give a neat appearance. The general arrangement of the office is shown in the accompanying illustrations and plan. Each department is provided with a specially designed portable wagon to convey records from the office to the vault in the basement and to avoid the necessity of employes carrying papers and boxes.

The electrical installation on this floor offers several novel features. The main feeders are carried from rigid iron conduit to National metal molding with push button switches. The base-boards are provided with two race-ways, one for bell and telephone wires, the other for electrical conduit. All bells and buzzers are concealed in the base-boards in standard wall boxes covered with ordinary push button switch plates, the sound passing through the holes in the switch plate. Pockets have been provided in room base for the ready insertion or withdrawal of wires, thus avoiding the necessity of tearing up any woodwork.

In addition to the regular telephone service of the Pacific Telephone & Telegraph Company, a Kellogg inter-communicating system has been installed throughout the building, there being 19 desk set stations in the various offices and 4 wall sets in the stock rooms. All telephone wiring is concealed, the lead covered cables carrying the various circuits being brought from the floor through special iron pedestals supporting the key box, which is flush with the top of the desks. A portable desk set is placed upon the office table or desk. This inter-communicating system allows eleven different conversations at the same time without interference, or if desired, all stations can be connected for one general conversation. Any number of stations can be connected simultaneously. By using the auxiliary system, it is possible to obtain information from other departments while holding the asking party over the outside toll lines.

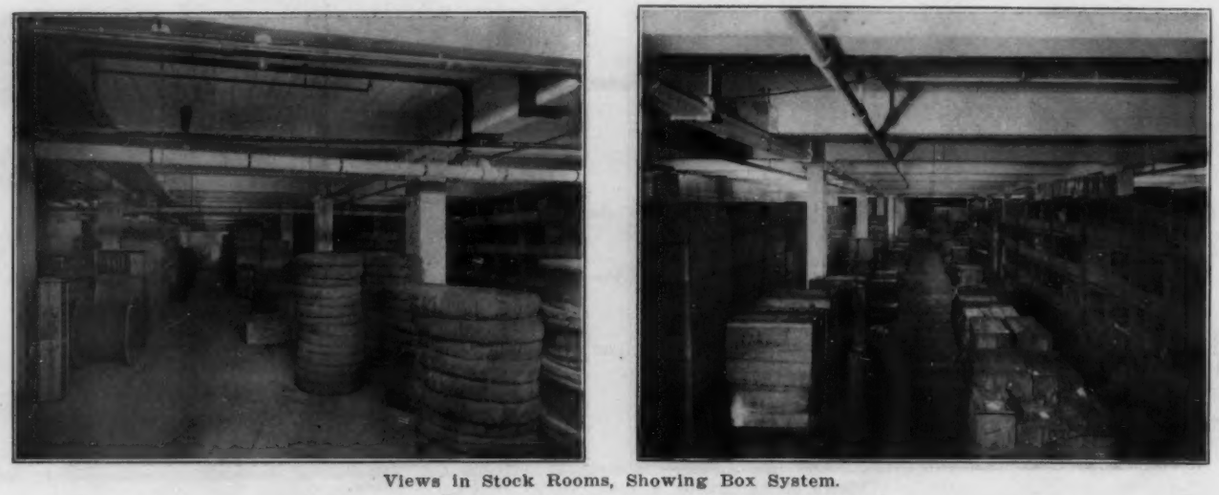
The offices are lighted by bowl type Veluria reflectors carrying General Electric Mazda lamps. This eliminates all glare due to the plate glass partitions and although only .7 watts per square foot is used, the illumination is perfectly diffused and is as near to daylight as is possible to obtain.

In the executive offices, a pleasing and efficient variation of the general scheme has been obtained by the use of single unit fixtures equipped with satin finish residence type Holophane reflectors.

Edison phonographs are used for dictation, operating from base-board receptacles on 110 volt direct current, while the lighting on this floor is 110 volt alternating current.

The girls' rest rooms on the sixth floor are an example of the care with which the welfare of each individual employe is considered by the company. Here is a beautiful reception hall with an adjoining dining room and electric kitchen for the exclusive use of the women employes. The entrance is from the main passenger elevator, thus providing direct communication to their quarters. An individual metal locker is provided for each girl. The rest room is beautifully furnished with Crex grass furniture, finished in brown to match the walls and draperies. It is fitted with base-board receptacles for portable lamp, vacuum cleaner, and inter-communicating telephone. The lighting is by four light clusters equipped with Holophane Iris shades. The dining room of large seating capacity opens directly to a sun porch protected from the west winds by a glass and steel screen. This sun porch is planked for the accommodation of chairs and rockers, while the remaining portion of the roof is provided with a six-ply asphalt and gravel roof laid over roof boards 3 in. thick, thus providing space for general recreation. The kitchen is equipped with a General Electric D 2 range, finished in white enamel with full nickel cooking outfit, including percolator, tea kettles, water heater, samovar, toaster, radiant grill, flat iron, hot plate and chafing dish. A set of white and gold china as well as silverware is also provided.

The display room on the fourth floor contains a complete exhibit of electrical apparatus, with provision for demonstration. Every article is tagged at the retail selling price so that the room may be used by contractors and dealers in showing apparatus to their customers and making their sale direct if they so de-



Views in Stock Rooms, Showing Box System.

sire. This room, like the general offices and the girls' rest room is wired with metal molding and condulet outlets. The illumination is similar to that in the offices.

The stock rooms are situated in the basement and on the first, second, third and fourth floors. Each floor and basement is in charge of an assembler and assistants. For assembling orders, the equipment of each floor comprises four-wheel truck for 1½ ton loads, dolly wagons for ½ ton loads and fibre boxes of various sizes for smaller articles. Each floor is under lock and key and no one but the assembler and assistants are permitted to enter it. The stock is charged to the assembler, who keeps duplicate stock cards as against the general stock cards, so that in the event of shortage he can prove his own delivery.

The stock is classified and arranged on each floor so as to facilitate delivery. Miscellaneous stock is carried in boxes resembling the standard built-up book case arranged in various sizes according to the nature of the stock, this excellent scheme being the result of the experience immediately following the San Francisco fire when other means could not be obtained. The lighter apparatus is carried on the upper floors and the heavy material on the first floor and basement. Portable electric lifts have been provided for stocking of heavy cases and barrels.

Suitable quarters have also been provided on the third floor as a lunch and reading room for the male employes.

The wiring of the building was planned for purposes of demonstration as well as for utility and a different equipment has been installed on each floor for inspection by architects, engineers, contractors and others, the whole building thus constituting an excellent display of electric construction methods. In addition to the equipment already described, the rear of the fourth floor and all of the third floor is equipped with galvanite conduit with Sprague boxes and pendant switches. The second floor is equipped with BX Greenfield flexible steel conduit, Greenfield flexible armored cable, Sprague outlet boxes and pendant switches. The first floor is wired with American conduit and condulets, pendant switches being provided in the rear and push-button switches in the store. The basement is wired with American conduit and Sprague boxes, the light being controlled by pendant switches. General Electric wiring devices and rubber-covered wires were used throughout the installation.

The shipping and receiving departments, as well as service office, are situated at the rear of the first floor. The orders, after being assembled on the various stock floors are sent to the main shipping room either by freight elevators or electric lifts, and upon reaching this floor a red alarm lamp advises the man in the shipping room that the material is ready to be distributed to the assembling benches, where provision is made for shipments by railroad, express, boats, city deliveries and city call orders.

The usual assembling bench has been adopted; but instead of the usual division and numbering scheme, the benches are divided into imaginary 1 ft. sections each foot of space properly numbered and division strips provided, so that assemblers take as little space for the assembling of each order as required and addition to or removal from assembling bench does not disturb the serial number of the other orders.

When the order is in the process of assembling one copy is always left in the assembling bench so that the man in charge of the shipping department knows at all times to whom and where the material is to be shipped. Immediately the assembling is complete, the assemblers place an additional blue ticket into the bin, indicating that the order is ready for shipment.

So as to facilitate the packing of goods and eliminate unnecessary handling, the old style packing bench has been abandoned and each packer provided with an ordinary hand truck on which boxes are placed and material taken from the assembling bench direct into packing cases. When the work is completed, the box remains on the hand truck until conveyed to the scales where all outgoing shipments are weighed and accumulated in the section of the shipping department ready for automobiles to haul to destination.

Provision has been made for separate doors for both shipping and receiving, to eliminate the possibility of incoming goods being confused with outgoing shipments. Scales set flush with the floor are immediately in the entrance way, with a section set aside for the receiving department, so that all incom-

Switchboard. Packing Benches. Shipping Department.
Distributing Conduits. Metal Chutes. Conduit Racks

ing goods can be carried across the scales and weighed without unnecessary delay. The receiving department is likewise provided with assembling benches similar to the shipping, in which small incoming pickups are assembled, the number of the bin being conveyed to the original bin so that assembler can readily match pick-up orders with goods assembled from stock.

Rigid iron conduit, No. 14 rubber covered wire, locknuts, bushings, elbows and couplings and similar articles considered either fast moving or difficult of handling, are carried on the main floor. To facilitate this work, special conduit racks have been provided for the proper storage of this material. Storage provision has been provided in the main floor for a capacity of 12 carloads of conduit, and accordingly the first floor has been designed to carry approximately 2000 lbs. per square foot if necessary.

The electrical equipment, in addtion to that already described is most complete. Both direct and alternating current is supplied at 110 and 220 volts by the Pacific Gas & Electric Company and the City Electric Company. The incoming mains pass directly to a slate switchboard in the basement. This board is equipped with D-12 knife switches for every circuit in the building, time switch and battery charging rheostat for electric auto trucks. General Electric glass face instruments have also been provided for the battery charging circuit by means of a charging plug at the rear of the building. The batteries may be boosted during the noon hour or when the automobiles are loading or unloading. Special panels have also been provided in the store and fourth floor display room to provide current up to thirty amperes for various devices such as electric ranges, rectifiers, fans, stage apparatus, etc. All the store lights together with four outlets for exterior arc and cluster lamps, special outlet for electric signs and two outlets for street posts are controlled either by the main switch from the store, or may be thrown over to the time switch. All service throughout the building may be discontinued by a contact push-button switch in the main lobby which has been provided for the special use of the fire department. All the large motor control devices are on 220 volt d.c. thus giving good speed control and economy in wiring as well as permitting the adoption of regular standards.

The passenger elevator at the front entrance is of the Otis automatic type, operated by one 15 h.p. General Electric motor with a capcity of 2000 lbs. at 175 ft. per minute. In addition to the usual control apparatus, it is provided with a safety attachment which prevents the removal of the car from any floor before the passenger is ready to alight. During the day the passenger elevator is operated by an attendant, so that the automatic feature is used only at night and other odd times. The elevator doors are of wrought iron and polished plate wire glass with transoms above, thus lighting the shaft and making it fire-proof.

The freight elevator is of the Otis automatic type operated by a 15 h.p. General Electric motor tested to a capacity of 2750 lbs. at 75 ft. per minute. It is further provided with automatic gates which will not allow the elevator to be operated while a gate is open, thus avoiding danger of unprotected hatch-ways. It

is arranged for both automatic call and dispatching, being the first of its kind to be installed in a freight elevator.

The two automatic lifts are of the Otis type of 200 lb. capacity operated at 175 ft. per minute. They give service between the basement and fourth floor and are equipped with the call bells for each floor, electric lamp signals showing arrival of car at destination.

A Lamson automatic tube system is arranged with a central station and tubes from the various floors centering to one point, from which they are re-distributed to the various departments. This is used for distributing correspondence throughout the building and the dispatching of orders. The carriers are twelve inches long in order to receive the ordinary charge tickets, the largest paper in use. and as a result, special radius bends are necessary. Each carrier is provided with a double revolving disc whose number and letter indicate to the attendant at the central station its proper destination.

The excelsior room, steam heating plant and vault are reached from the basement and so situated under the sidewalk or in the lightwell so that they are distinct from the building. All these doors as well as those of the elevator and lifts are tin-clad with lock seams. Metal chutes are provided in the front and rear of the basement to facilitate delivery of the material stored there. The building is provided with six exits in case of fire, there being stairways, elevators and fire escapes at the front and rear.

All floors, beams, posts and other framework are of slow-burning construction. This type of construction is considered by insurance companies as a very safe risk. The timbers are of such dimensions as to make risk from fire very remote. The columns range in size from 14 in. to 16 in. in the basement to 10 in. by 10 in. in the fifth floor, while 8 in. by 8 in. columns, the smallest size permitted by the rules of the National Board of Fire Underwriters, support the roof over the sixth story.

The girders and beams throughout are respectively 12 in. by 20 in. and 10 in. by 16 in., except those supporting the roof, which are respectively 8 in. by 12 in. and 8 in. by 10 in. The girders supporting the first floor were reinforced by bolting together two pieces of timber, each 6 in. by 20 in., between which was placed a steel plate ½ in. thick and 20 in. deep running the full length of the girder.

The windows of Mission street frontage, where there was no insurance credit or penalty, are of wood, pivoted and arranged with transom. All others are fireproof metallic windows, glazed with wire glass. The windows of the fifth floor are double hung and the glass polished plate. Those in the lofts facing Minna street are fixed sash of wrought steel construction, having pivoted sections. The glass being corrugated. A steel and glass awning is to be put up at the rear of the building to protect teams while loading and unloading.

From this description it is seen that every provision has been made for the rapid and accurate handling of orders which foresight and ingenuity can devise. The building was erected under the immediate direction and inspection of the company, the architect being Leo J. Devlin.

THE DIESEL ENGINE FOR CENTRAL STATION SERVICE ON THE PACIFIC COAST.

BY J. W. WHITE JR.[1]

The communication to the Journal by the Snow Steam Pump Works through their consulting engineer, Mr. S. B. Daugherty, in discussion of the writer's article in your issue of November 2, 1912, is extremely interesting because it gives authentic data on the subject of Diesel engine operation from one of the largest manufacturers of power machinery. If the manufacturers in general would give as much data in proportion as that contributed by Mr. Daugherty, the Diesel engine would take its proper place among prime movers in a short time.

In discussing the development of the Diesel engine in his article of November 2d, the writer had in mind to present to the readers of the Journal information representing the general development, and not the specific development of the Diesel engine by any one manufacturer, and therefore, while a number of points taken up by Mr. Dougherty in criticism of the writer's article may be correct in so far as a comparison between the writer's article and the Snow engine is concerned, still the general development of the Diesel engine from a commercial point of view is in nowise changed by Mr. Daugherty's remarks.

Mr. Daugherty takes exception to a number of points brought out by the writer, particular among which are:

(a) The relative merits of American and foreign built engines, in which the writer stated that the European design is the more successful.

(b) A smaller increase in fuel consumption for the two cycle engine than that given by the writer.

(c) Application to central station service.

(d) Cost of Diesel engine plant.

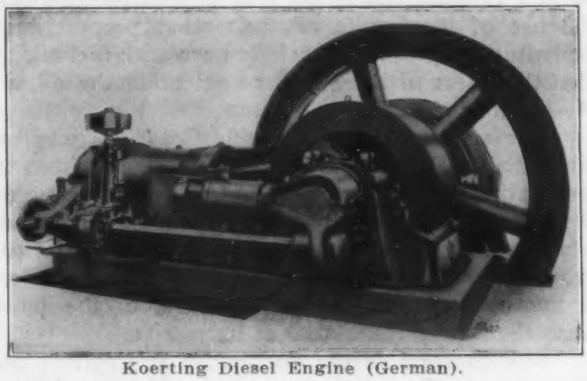
(e) Application to California conditions.

With reference to Mr. Daugherty's remarks regarding American and German practice, in which he asks, "What is American practice?" It would appear that if but one engine has been built and designed by Americans, and is distinctive in its features, it would be "American practice." As a matter of fact, the American Diesel Company and the Atlas Engine Company both make a Diesel type of engine of distinctly American design, and to which the writer referred as American practice. Whether the design of the Snow engine is superior to that of the engines referred to has not as yet been demonstrated to the American public, and whatever the result of such a comparison might show, the two companies mentioned must be credited with the fact that they have been the pioneers in the building of what constitutes the American design in Diesel engines, and inasmuch as they have spent considerable time and money to develop their product, Mr. Daugherty should give them credit for the pioneer work done.

Both of the above companies have a number of Diesel installations which are operating very economically and successfully, where installed under the proper conditions, and using the proper fuel. One of the principal reasons why the Diesel engine has not secured a strong foothold in America is because it

[1]Consulting Engineer, 722 Mills Bldg., San Francisco.

has not been applied under the proper conditions. Who shall say that a good boiler is not a good boiler when the chemical deposit in the feed water chokes up the tubes. It is the indiscriminate purchase and use of Diesel engines, together with the exaggerated claims for it by unprincipled salesmen which has held back its advancement.



Koerting Diesel Engine (German).

A great many of the features, which are mentioned in Mr. Daugherty's article, covering the design of the Snow engine, are similar to German practice, but in accepting and incorporating the features of German design into American engines does not constitute American practice. German features are apparent even without the use of the label "Made in Germany."

(b) As to the increase in fuel consumption of the two cycle engine over the four cycle, Mr. Daugherty admits that it is higher, and takes exception only to the concrete figure of 18 per cent. This figure was simply given as an average, and varies with the design of the engine and the relative merits of the scavenging features employed. The figure of 18 per cent is that given by the Machinenfabrik Augsburg Nuernburg, A. G., which company is referred to by Mr. Daugherty.

The writer takes decided objection to the statement made by Mr. Daugherty that the screening of the inlet ports of American built engines is done to deaden the noise of entering air. The velocity of air through the inlet ports is relatively high, and therefore, if not screened, will draw in foreign matter, which will seriously affect the operation of the engine.

(c) In the writer's article, he calls attention to the application of Diesel engines to central station service under California conditions, and any remarks made cannot be considered as detrimental or imperical in the application of the Diesel engine to industrial service.

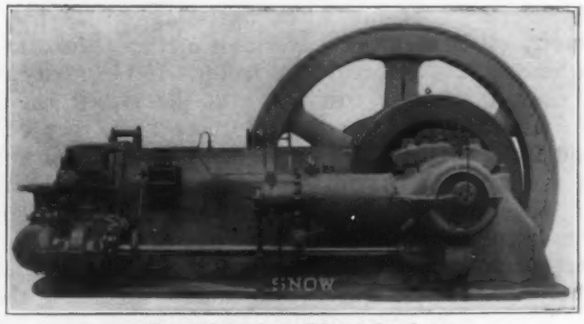
The requirements of central station service are the most exacting, and at the same time, give the lowest load factor. Therefore, the fixed charges to be figured against the Diesel unit have a greater bearing upon its use in central stations than it would under average industrial service conditions. It is definitely certain that the commercial application of the Diesel engine to certain classes of industrial and central station service will bring about cheaper power costs than any other type of prime mover on the market today, but until the manufacturing cost of Diesel engines is reduced materially, its general application for central station service will be limited.

In the writer's article of November 2d, he assumed the cost of a Diesel engine plant installed at $150 per kw., and that of steam turbine plant installed at $80 per kw. Mr. Dougherty is of the opinion that a Diesel plant would cost considerably less. The writer tabulates below an average of the cost of such a plant as Mr. Daugherty suggested; i.e., five units of 200 kw. each:

Switchboard installed—5 panel	$ 2,000
5-200 kw. generators, f.o.b. factory	7,500
5-Exciters, f.o.b. coast	1,500
5 foundations, 150 yds. each at $7 per yd	5,250
Erection of five units, weight each approximately 50 ton at $10 a ton	2,500
Freight on 250 tons at $1.50 per cwt	7,500
Building, approximately 120 x 50 ft.	15,000
Station wiring	1,500
Crane installed	1,000
Engineering, superintendents at 4 per cent on $150 per kw.	6,000
Total	$49,750

From the above estimate it is evident that if Mr. Daugherty's company can deliver engines for less than $100 per kw. f.o.b. factory, every dollar less than this amount may be deducted from the writer's estimate of $150 per kw. The readers of the Journal would appreciate advice from Mr. Daugherty as to the approximate cost per kw. of Diesel engines f.o.b. factory, because this more than any other factor will determine their applicability to central station service on the Pacific Coast.

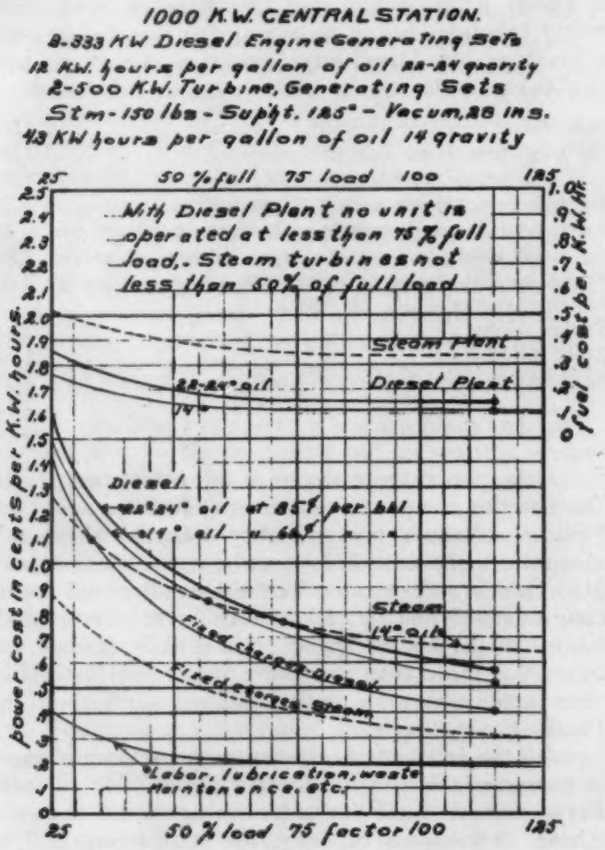
On the basis of the above costs per kw., a curve is presented showing the total power cost of both Diesel and steam turbine units in this specific instance. Above 1000 kw. in capacity, the comparison will be much less favorable to the Diesel engine; while if a single unit were to be purchased of 200 kw. capacity, the Diesel engine would have a decided advantage over the steam unit, assuming Mr. Daugherty's statements are correct, and figuring 33 per cent thermal efficiency of the Diesel units.



Snow American Diesel Engine.

Figuring 30½ per cent thermal efficiency as an average operating condition to cover lower efficiency at fractional loads, and also for fall off in economy due to wear of piston rings, etc., the power cost curve of the Diesel engine being plotted for oils of 22 to 24 gravity, and also for oils of 14 gravity, (upon which the Snow engine is claimed to operate successfully), the power cost for fuel only will be noted on the upper half of the curve; while the total power cost is given below. In this comparison, labor, lubrication, waste, and maintenance charges are assumed

the same for both steam and Diesel units. The maintenance of the Diesel engine so far has proved to be much higher than the steam turbine, but this is offset to a great degree by the absence of boilers.


1000 K.W. CENTRAL STATION.
2-333 KW Diesel Engine Generating Sets
12 Kw. hours per gallon of oil 22-24 gravity
2-500 K.W. Turbine, Generating Sets
Stm-150 lbs - Sup't. 125° - Vacum, 28 ins.
13 KW hours per gallon of oil 14 gravity
25
50 % full
75 load
100
125
With Diesel Plant no unit is operated at less than 75 % full load, - Steam turbines not less than 50% of full load
Steam Plant
22-24° oil
Diesel Plant
14°
Diesel
22-24° oil at 85¢ per bbl
14° oil " 66¢ " " "
Steam
14° oil
Fixed charges-Diesel
Fixed charges-Steam
Labor, lubrication, waste
Maintenance, etc.
power cost in cents per K.W. hours
cost per K.W. Hr. of fuel
25
50 % load
75 factor
100
125

Due allowance has been made in the steam plant power cost for banking and standby losses, as mentioned by Mr. Daugherty.

Examination of this curve will show with 5-200 kw. units none of which are operating at less than 75 per cent full load, the full load power cost curve of the Diesel engine when operating on 22 to 24 gravity oil crosses the power cost curve of the steam turbine at 72½ per cent load factor. If 14 gravity oil is used, the power cost curve of the Diesel engine crosses that of the steam turbine at 57 per cent load factor, and if the cost of fuel is left out entirely as a charge in the total power cost of the Diesel engine, the curve showing the fixed charges of the Diesel engine crosses the total power cost curve of the steam turbine at 33 1/3 per cent load factor. Therefore, Mr. Daugherty's calculations showing that the power cost curve of the Diesel engine, including fuel, crosses that of the steam plant at 33 per cent is entirely erroneous.

It is admitted that the low price of fuel on the Pacific Coast shows the oil engine at a disadvantage, but while the price of oil is undoubtedly on the rise, the price of refined oil is going up faster than the price of crude, so that if the Diesel engine is not successful in operation on 14 gravity oil, the advance in price of the refined oil over the crude oil will partially offset the better showing of the Diesel engine over the steam turbine with increased fuel cost.

The conditions under which the writer compared two units are actual conditions at the present time. What the future holds will be subject matter for further comparison. Diesel engines are operating on the Pacific Coast successfully on 24 gravity oil, but we are not advised of any engines operating on 14 gravity oil. Mr. Daugherty omitted some very important information in his article in connection with the use of low grade oil, i.e.: what percentage of asphaltum they can successfully burn with fuel oil, and also the effect of the sulphur content in the oil, and the limiting percentage.

The engineers on the Pacific Coast are intensely interested in the success of the Diesel engine, but the installation of an oil engine on the Pacific Coast under improper and adverse conditions, and under claims which cannot be substantiated, are more harmful to a growing business for the manufacturers, and will be more detrimental to the interests of the power users than the under-rating of its merits.

The question of the oil gravity and carbon content which a Diesel engine can burn successfully is just as vital as the limiting percentage of hydrogen contained in gas for large gas engines,———— ———— the ill-advised installation of which has cost the central station man, the manufacturer, and the ultimate customer on the Pacific Coast a great financial loss, as well as holding up the application of the large gas engine to Pacific Coast conditions for four or five years.

The Snow Gas Engine Company is to be congratulated on bringing out a Diesel design which can operate at such high efficiency on such low gravity oils, and its installation on the Pacific Coast will be watched with great interest by everybody.

NEW TRAFFIC ORDINANCE AT PORTLAND.

The traffic ordinance recently passed by the Portland City Council went into effect on January 12th. It provides for the whistle system of traffic regulation by the police, a new departure in Portland. It defines a "congested district" in which a speed of 15 miles per hour is permitted, as compared to a previous limit of 12 miles per hour in the city limits. Outside of the congested district, but within the city limits, 25 miles per hour is allowed. This provision, as well as the one making it unlawful for a driver to knowingly delay a car when it can be avoided, are particularly favorable to the street railway company. Another clause makes it unlawful for any vehicle to stand in any one place in the congested district for more than thirty minutes, and no more than one such period within two hours between 9 a. m. and 6:30 p. m.

THE MYRIAWATT.

A myriawatt is the unit of thermal or mechanical power recommended by committees from the A. S. M. E. and A. I. E. E. to be used instead of the term "boiler horsepower" in connection with boilers, producers, turbines and engines. The myriawatt is 2 per cent larger than the most recently determined values of the boiler horsepower, also being 10 kilowatts. By this means the long existing incongruity of stating the input and output in different and disconnected units of power will be eliminated.

THE ELECTRICAL CONTRACTORS' DEPARTMENT

MUNICIPAL ORDINANCES ON WIRING.[1]

BY H. JOSLYN.

In response to your kind request to present a paper on our municipal ordinances governing electric wiring, and particularly wiring in buildings, I have tried on several occasions to draw up a paper covering this subject. I find, however, that I might as well take the ordinances and read them to you as to do anything of that kind, because so many points are covered that even to begin writing about them in a general way would require a great deal of time. I prefer, with your indulgence to take up the main points on our inside wiring ordinance and discuss them in general without reference to manuscript. It will be more or less of an informal talk on the subject.

The wiring inspection work in Seattle, so far as a regular office is concerned, dates back some thirteen or fourteen years when the Underwriters' Electrical Inspection Bureau was established, under our insurance surveyor's office, with Mr. Hughes as head inspector. This office grew rapidly until it assumed considerable proportions and covered practically all of the wiring done of any importance, particularly that out of which they could get a fee. In the early years of my service with the city I found that the inspection rules were not the same in all cases, some contractors being required to do one thing on one job, and others differently on another, much to the discredit of the inspection office. Investigating municipal inspection in other cities, I found that its establishment had practically done away with controversies of this kind. Upon taking up the matter with our city council, we met with strenuous opposition from the insurance surveyor's office for several years, but were finally successful in obtaining passage of ordinances regulating the wiring in buildings. A few months after the establishment of our inspection office the insurance surveyor for the state notified us that they would gladly accept inspections made by the city department, and since that time our relations have been very pleasant. Mr. Cheney, who is electrical engineer under the insurance surveyor's office for the state, has endeavored to co-operate with our office at all times; and we understand that his principal work now is an endeavor to keep municipal inspection throughout the state up to the standard. We use his office and the underwriter's laboratory as a reference, particularly on approved material and equipment.

The National Code, as you doubtless know, treats fully of the insulation of wire and construction of electrical equipment, but it is impossible to use the code as a reference in a city ordinance. It would have no standing as a book of reference in case of contest before court. After consultation with our legal department we found that the ordinance would have to embody the rules of the code drawn in a manner to make them mandatory. To this end, practically all the code is embodied in our city ordinance, but the statements are positive, and the word "Approved" is used as little as possible.

The first important point in inspection work is to obtain knowledge of the work to be done, to which end all people doing electrical work are required to come to the office of the city electrician and take out a permit, based upon their written application. At the present time a schedule of fees is in use for permits on different classes of work, but the fee system will be abolished on and after January 1, 1913. A duplicate copy of the permit issued to the contractor is attached to his application and given its serial number, thereupon becoming the basis of the office records for that particular piece of work. The card catalogue of addresses for the different jobs is also kept as reference only. All copies of corrections found by the inspector on each job are attached to the respective permits with a view to making the permanent record of the wiring in each house; all of which is accessible when any person desires to look up the wiring conditions regarding property they wish to purchase. The regulation of the ordinance applies particularly to wiring for light, power and heating devices, there being no particular requirements on call bell or small signal wiring, unless the wires are close to those carrying higher voltages; in which case the rules of the ordinance must be observed the same as for light and power wiring.

The city ordinances prescribe that in buildings of the "A," "B," "C" and "D" Classes, according to classification of the city building ordinances, and in buildings used for storage and warehouse purposes, all wiring must be encased in metal conduit, armor or molding. Practically speaking only frame buildings are exempt from the four classes mentioned above. It is also required that wiring for building of the above classification shall be shown upon a diagram or plan filed with the application for permit. Cabinet boxes in all buildings must be of metal.

After permit is issued to the contractor, the office depends upon him to notify it by permit number when the work is ready for inspection. There is a mistaken idea among some people that the inspection department has only 48 hours' time to make inspection after having been notified that the work is ready. This idea is not in any sense correct, and the ordinance prescribes a penalty for any person covering up work before inspection; in addition to which the inspector is authorized to remove lath, plaster, etc., to obtain proper view of the wiring.

It is further prescribed that after three months, or oftener, if desired, the inspector may go into any building and re-survey work that has been done. If any wiring is found to be in a hazardous condition a report is made to the chief of the fire department upon the basis of which he is authorized to condemn the wiring.

The electrical rules may be sub-divided into two principal parts, viz: Construction and Installation.

[1]Address by the City Electrician of Seattle before the Seattle Branch of the American Institute of Electrical Engineers.

Under the head of construction the principal change in recent years in the regulations of the National Code has been in the insulation of wires. Rubber insulation is now subjected to four tests, viz: 1st—The voltage test applied after the completed wire has been immersed for not less than 12 hours. 2d—The elasticity test, which consists of revolving insulated wire around a shaft under pressure and the whole immersed in water for 24 hours, after which it must resist insulation break down test of 1500 volts alternating current. 3d—The stretching test which is given to a sample of the insulation carefully cut from the wire. 4th—A chemical test which is practically only used by the testing laboratory. The stretching test is applied by the inspector in the field to determine the character of the insulation and consists of stretching a sample, upon which marks have been placed 2 in. apart, slowly until the marks are 5 in. apart, then it must recede to not more than 2½ in., after which the wire must again be stretched until the marks are 6 in. apart. The insulation of all wire is treated as new, whether it has been in stock 10 days or 6 months, and must withstand the above test in the field. Lead covered wires have practically the same tests, except that they have lead covering. The braid upon rubber covered wires must meet the approval of the inspector, which means that a braid must not be rotten or insufficiently saturated with a preservative compound.

Flexible cord is generally divided into three grades: 1st—The so-called "Common Cord" which is usually stranded wire covered with rubber and an outside casing of ordinary cotton wind. This cord is not approved for use as line wire or for general purposes other than suspending a light in a vertical direction not lower than 6 ft. from the floor. Common cord is not permitted in show windows or in places of unusual temperature or moist air. 2d—Reinforced cord is practically the same as common cord, but with an additional strong outer covering of a substantial character. With this protection it may be used for ordinary portables and some in contact with furniture or other surrounding objects not possessing sharp edges. For use in damp places the outer covering must be saturated with a moisture proof preservative compound. 3d—Cords for heating appliances are required to have covering of rubber not less than 1/64 in. thick and a braided cover of not less than 1/32 in. thick, which shall be composed of long fibre asbestos; and the several conductors comprising the flexible cords must be enclosed in an outer reinforcing covering of approved strength.

Fixture wire is the one exception to the rule that No. 14 wire is applied to all branch circuits. On account of reduced load and smallness of space to be occupied, fixture wire may be used in sizes as small as No. 18 gage. The insulation shall not be less than 1/64 in. rubber for No. 16 wire, and must be covered with a standard braid.

Wiring for stage cables must not have less than 3/64 in. thickness on conductors of capacity not less than No. 14 wire; and the several conductors comprising the cable must be bunched together and covered with a strong outer covering; spaces between conductors having a filler to make the cable round and symmetrical. The city ordinances permit the use of wooden moulding in certain places when not concealed and it is vigorously required that all moulding shall be covered with shellac, both inside and out, as some protection against moisture.

Wires for use in conduit must have double braid to protect against abrasion and the general requirements for conduit, metal moulding and flexible armor are set forth in the ordinances along the lines of smooth interior surfaces and approved fittings designed to protect against sharp edges and allow reasonable space for splices. The construction of snap and knife switches, sockets, rosettes and fuses is all particularly specified in the city ordinances and material of this character must have the approval of the underwriter's laboratories. The inspection department has recently experienced some trouble with the construction of split knobs in that the bases of some knobs were found to be less than the 1 1-8 in. diameter required by the city ordinances. This matter has been taken up with the manufacturers and knobs of the required size are now being furnished. Metal cutout cabinets now being required, much trouble has been saved which formerly arose from insufficient lining and other details pertaining to wooden cabinets. It has not been the practice of the inspection department to favor cutout cabinets built up in sections, and some cabinets have been rejected because of the poor quality of fastening used for the door. All metal cabinets of large size should not only be constructed of metal, sufficiently heavy, but should have doors reinforced and mounted in a manner to effectually close the box at all times.

Under the head of installation the finest question arising is the location of main switch and cutout, which our ordinance requires to be at the nearest accessible point to the entrance of wires of the building. The average contractor does not seem to appreciate any danger in carrying his service wires for some distance into a building without a fuse as long as the wire is in conduit. In the past year or two several fires have been caused by this class of work and inspection departments generally recognize the importance of this regulation. In estimating the size of main and sub-feeds it is the practice of this office to calculate 6 amps. as the load for all branch circuits in stores, and similar installations. For hotels, office buildings and apartments the feeders may be estimated at 75 per cent of the total amperage obtained by multiplying the number of branch circuits by 6 amps.

In the installation of knob and tube work, particular attention should be paid to the proper installation of bushings; no knobs should be placed on header boards or the under side of floors; all taps should be relieved of strain upon the joint; wires should be at least 1 in. from the surface wired over and supported at distances not greater than every 4½ ft.; all joints should be thoroughly soldered and taped with both friction and rubber covering; all wires running in proximity of metal pipes should be protected therefrom by porcelain bushings taped in place; suitable mud guards in form of tubes should be placed on wires

above all floor plates and fire stops where run in vertical partitions; all wires run in side walls should be tightly held in position by knobs; and where wires are fished for any considerable distance they should be protected by loom. One frequent correction found by the inspectors is on the use of circular loom at outlets on porches and in other places where it may be subjected to moisture. In bringing wires into metal cabinets they must be protected by an approved porcelain bushing and no knock-out holes must be left open in cabinet boxes. The inspection department requires the use of loom at least 6 in. long for wires at all outlets, the installation of meter loops with wires extending at least 24 in. from cabinet box or point of leaving partitions; and service mains with at least 12 in. length for each wire measured outward from the service head.

In conduit work it is the general practice to limit the installation in ½ in. conduit to one circuit, and in ¾ in. conduit to two circuits. A few exceptional cases may arise in very short runs without bends where two circuits may be permitted to be pulled into ½ in. conduit. The use of oil or grease to facilitate the drawing of wires into conduit is strictly prohibited; powdered soapstone, or similar material being preferred. All conduit must terminate in an approved outlet or junction box, or condulet, and it is necessary to install locknuts and bushings in all cases to insure tight connection between conduit and outlet or junction boxes. One correction often found in connection with conduit work is the neglect on the part of the contractor to see that outlet boxes are properly fitted with covers; and it has, at times, been very annoying to the department to hold up certificates of inspection for one or two small details of this character.

Approved ground clamps are required for connection between ground wires and conduit; and it is the general requirement that conduit shall be grounded with the possible exception of a piece one or two feet long used for encasing service wires in a residence where the rest of the wiring is not in metal.

Flexible metal conduit, both as an open tube and as an armor for prepared cables, has largely increased in use since the establishment of the inspection office on account of its convenience in wiring in awkward places about buildings. Its use is approved in all cases except where surrounded by permanent dampness or moisture.

Fixtures are required to be insulated from gas piping by an approved insulated joint, and canopies must be thoroughly insulated where placed against plaster walls or ceilings in fireproof buildings, or against walls and ceilings made of metal or containing metal lathing. All fixture arms smaller than ½ in. outside diameter must be firmly secured by cement or the use of a set screw; and flat canopies on electric or combination fixtures can only be used in connection with outlet boxes. Fixtures must not be used in show windows or in the vicinity of inflammable material when wired on the outside; and when installed on the outside of frame buildings must be of waterproof construction.

Special equipment in form of vapor tight globes is required for enclosing sockets used in rooms containing inflammable gases, acids or other injurious fumes; and it is a general requirement of the department that sockets and similar current carrying equipment must not be installed where the person handling the same is liable to grounded contact. This latter provision applies particularly to sockets in lavatories, bathrooms, etc.; and it is a general requirement that in small bathrooms switches shall be placed on the outside of the wall. Pull chain sockets with an insulating link in the chain are approved for use in places of this character.

Corrections are frequently made upon the insulation of flexible cord on account of its not having a knot for taking off strain from its connections in sockets, rosettes, etc., and because the stranded ends of the wire are some times left in loose form instead of being taped into the form of an eye or dipped in solder to make solid.

Some criticism of the office has been made by contractors because their statement of load to be placed upon branch circuits, etc., will not be accepted by the department without investigation of conditions. It has been found necessary for the inspectors to check up the probable load to be placed upon circuits, both from plans and on the ground, in order to determine a reasonably safe size for the feeders. In general the office will not approve of more than eight outlets on branch circuits in residences and six outlets on branch circuits in business buildings. Considerable question has been raised as to the size of wires to be installed for alternating current motors of different capacities; and the tables furnished in the back of our printed copy of the ordinances are intended to serve as a guide for this purpose. Tables are also printed giving other useful data and diagrams are shown illustrating the method of wiring for the heating and cooking service furnished under special rates by the city plant.

A particular portion of the ordinance covers the wiring of theatres with a number of regulations peculiar to the type of equipment used; and on account of its special application the subject will not be dealt with at present.

Since the establishment of the inspection department in July of 1910 almost 24,000 permits have been issued and approximately 45,000 inspections made. It has been difficult to find time for resurvey of work done at previous periods, but it is our hope to begin doing this at an early date. The improvement in the class of work done in the city since the beginning of municipal inspection has been very noticeable; and we do not know of any instance where a fire has been caused from an electrical hazard in an installation which has been inspected by the office. On account of the varying personnel of contractors and wiremen who take out permits, the office does not seem to be able to get away from answering questions of the simplest character in regard to work being done; and we urgently recommend that steps should be taken to obtain the passage of a state law which shall determine by examination the qualifications of any or all persons desiring to install electric equipment and govern their practice by proper licenses. I thank you for your courteous attention.

OUTSIDE WIRING.

BY J. J. WETTRICK.[1]

The subject of outside wiring is confined mainly to wiring upon poles and upon building roofs and the outside of building walls.

At the general election of March, 1911, there were passed two ordinances, one an Initiative Ordinance and the other a Referendum Ordinance.

In this way there were two ordinances submitted pertaining to overhead wiring at the general election of March, 1911, which were in some particulars contradictory but both of which passed.

There is a charter provision which provides that in a case like that the one receiving the most votes shall be the one in effect. That happened to be the initiative ordinance so that the referendum ordinance became void. They were the same in the main. The initiative ordinance was gotten up by the Linemen's Union of the city and the referendum ordinance by the public utilities department in conjunction with the city lighting department, telephone companies and Puget Sound Traction, Light & Power Company. The initiative ordinance, in fact both ordinances were designed to protect the linemen and firemen in their work by removing as many as possible of the dangers attending their work and making it possible for their work to be more expeditiously done.

The difference in the two ordinances is that the initiative ordinance is more strict, generally speaking, than the referendum ordinance; that is it requires things that were deemed unnecessary and that were consequently not included in the referendum ordinance. I have a copy of both ordinances and I will take the initiative ordinance and run through it hurriedly, taking up the main points of interest and comparing them as I go along, with the referendum ordinance. They are somewhat similar all the way through with the exceptions stated.

Section 1 merely gives some definitions.

Section 2, Division 1, states that it shall be unlawful for any wire carrying 600 volts or less to be placed within 13 in. of the center of a pole. There is somewhat of an absurdity creeps in here from the fact that the provision applies to wires of 600 volts or less only, which would mean, if the ordinance were strictly construed that any wire over 600 volts could be placed within less than 13 in. of the center of the pole, which is the very fact which they aimed to avoid; it is the high tension wires that we wish to keep away from the pole. There are some exceptions to this provision. The first one is: Wires that come from underground conduits and pass up vertically on the pole and then along the lead. Bridle or jumper wires attached to signal wires on the same pole. Aerial cables terminating upon a pole. That I think refers mainly to telephone cables. A fourth exception is a wire or cable attached to the top of a pole. This affects the city electrician more than any other as he generally runs his wires along on tops of the poles.

In addition to these four exceptions which are all that are mentioned in the initiative ordinance, the referendum ordinance has two other exceptions. The first, telephone or telegraph cables on purely telephone or telegraph poles. The telephone company has a method, where they run short of wires, to fasten rings to the bottom of cross-arms and run some duplex wires through, sometimes one-half a dozen or more, so this is an instance where the referendum ordinance was a little more liberal by excepting these from the provision of 13 in. from the center of the pole. There should be a space of 26 in. between the two wires nearest the pole for the lineman to crawl through.

Section 2, Division 2, says that wires of 600 volts or less shall not be run along a pole without being attached to it within less than 13 in., practically the same as the foregoing.

Wires of less than 600 volts must be not less than 3 ft. from wires of over 600 volts. This may seem peculiar from the fact it makes the dividing line 600 v. so that you could take any wire above 600 v. say 2200 v., and place it as close as you wished to a 5000 v. wire; or you could take a 2200 v. and put it next to a 60,000 v. but the reason that was done was the way it affects the the lineman's work.

There are some exceptions to this rule as specified in the ordinance. The first one is that of secondary wires, where they enter the transformer. For a distance of 3 ft. measured along the wire this rule does not apply.

Another exception is: wires within buildings and structures. This should more properly be in the inside wire ordinance; and another exception is underground wires placed vertically on poles and service wires leaving poles to go to buildings. This is about the same as it is in the referendum ordinance and necessitates what might be called freak construction, principally in connection with the street lighting system. The street lighting circuit, which carries from 2400 to 5000 volts, is usually placed on the outside of the upper cross-arm and, in order to reach the light which is usually on a gooseneck farther down the pole, and at the same time keep three feet away from all wires under 600 volts, it is necessary to put a bracket extension on the arm carrying the street circuit, going from here back to the pole just above the gooseneck, then out to the light. The most difficult situation is the one when the light is on a corner pole with wires going in four or more directions. This has been met with what might be called mast arm construction, consisting of a mast or iron pipe from 10 ft. to 15 ft. long placed on the pole in a horizontal position or at right angles to the pole. The wire is then run down over the end of this, then back to the pole and out to the light as before. The most important effect of this provision, however, is that it required the reconstruction of practically all the light and power leads in the city, which means an expenditure of approximately $250,000 on the part of the city lighting department and $150,000 by the Puget Sound Traction, Light & Power Company due to the fact that all the leads built before this ordinance went into effect were built with the then standard distance of 2 ft. 4½ in. between centers of cross-arms and this must now be 3 ft., and 4½ ft. where buck arms are used. The majority of the poles are not of sufficient height to permit this change and must be replaced with longer poles, particularly in the case of combination leads.

[1]Chief Engineer, public utilities department, Seattle.

Section 2, Division 4. Relates to guy wires. All guy wires must have an insulator not less than 8 ft. nor more than 10 ft. from each end; that means two insulators on all guy wires. This seems to be superfluous, especially in guys on poles carrying only low potential wires such as telephone and signal wires. I might say at this point that we have found that it is not a good policy to insist too strictly on all of the provisions of this ordinance. The Supreme Court of the United States has indicated a way out of difficulties of this kind and we have followed them somewhat by reading into the ordinance the word "reasonable" and find that this avoids a great deal of trouble. The only exception to this provision of an insulator or circuit breaker at each end is in the case of guys to anchor rods which must have at least one insulator.

The referendum ordinance has one further exception and that is grounded cables when they are not above electric light wires. It doesn't say exactly what is meant by grounded cables but I presume it means messenger wires that support the telephone lead covered cables. They are grounded at intervals along the route and when they terminate on a pole it is necessary to guy the pole, due to the strain and the referendum ordinance did not require a circuit breaker in this guy. This is a very good exception for the reason that there is so much strain in these guys that it is difficult to get a circuit breaker that will carry the strain.

Section 2, Division 5, simply says that vertical wires on poles must be encased in wood not less than 1½ in. thick. The referendum ordinance in this particular says that they should be sufficiently encased providing metallic cases should not extend upward to a point higher than 4 ft. below the lowest cross-arms. In the initiative ordinance no metallic casing is allowed.

Section 2, Division 6, provided that no transformers are to be placed on poles carrying arc lights. This, I think is a very good provision that did not appear in the referendum ordinance.

Section 3. Telephone, telegraph and messenger wires are to be placed on separate poles from light and power wires when possible but when on poles carrying electric light and power wires suitable guards shall be maintained between them. The referendum ordinance is more strict. Such wires must be 4 ft. from any wire carrying 300 v. or more, and also provides for guards approved by the superintendent of public utilities. It is not the best practice to put telephone or telegraph wires on poles carrying electric light or power wires but is sometimes necessary due to the fact that both sides of the street may be occupied by electric light and power wires and the telephone company must get on that street. Heretofore the practice has been to put these wherever space was available but we have tried as much as possible to keep the telephone or telegraph wires below the electric light and power wires for the reason that the latter stand more strain or are less apt to break, leaving less danger of contact between the two.

Section 4 relates principally to transformers and is the same as that in the initiative ordinance, except that the first three divisions of this section in the initiative ordinance did not appear in the referendum ordinance. The first division of section 4 reads as follows:

Where transformers are to be connected to high voltage wires the secondary system must be permanently grounded and provision must be made for it when transformers are built. The referendum ordinance has the provision making it obligatory to have transformers grounded. This simply says they may be grounded.

Division 2: They shall not be attached to outside of buildings unless separated therefrom by substantial supports and shall be placed where practical on poles rather than on buildings.

Division 3. All transformers used for low potential distribution in the city of Seattle shall conform in insulation material, method of insulating, construction, reconstruction and repair to the latest standard practice, and shall be subject to break-down tests between the primary and secondary coils and cases at three times the highest normal voltage alternating. Said test to be made by the owner, constructor or repairer of said transformers, as the case may be, who shall provide himself or themselves with step-up transformers or other means of procuring the required test electromotive force, and said tests shall be made in the presence of and under the direction of the superintendent of public utilities when so required.

The referendum ordinance has a further provision that the manufacturers' certificate of inspection shall be accepted as complying with the ordinance so that a purchaser of transformers, if he has a manufacturer's certificate of test, need not go to the trouble of applying for a test.

Section 5 provides that all wires originating or terminating on an insulator attached to a pine, shall be attached to at least two such insulators except wires to buildings or wires originating or terminating on strain insulators or circuit breakers.

In this particular the referendum ordinance excepted wires of 14 B. & S. gauge or less, which includes telephone, telegraph and signal wires. To strictly comply with this ordinance it would mean that wherever a telephone wire terminates on a pole it must be attached to two insulators or two pins which means a pole would have to be double cross-armed. There is hardly any pole that does not have at sometime a wire terminating on it so it means that after a few years practically every telephone pole would be double cross-armed. This is one place where we have read into the ordinance the word "reasonable." We always require a double cross-arm where the lead terminates where there are only one or two wires terminating on a pole not at the end of a lead, we do not require it to be double cross-armed because it seems unreasonable.

Section 6 refers to roof fixtures and does not appear in the referendum ordinance. The main provision in it is that all roof fixtures shall be of a type approved by the superintendent of public utilities and must be painted. It also says these fixtures shall be of such height and so placed that all wires supported by them must be seven feet above the highest point of roofs of less than ¼ pitch and not less than one ft. above the ridge of roofs of more than ¼ pitch. A question comes up here in connection with fire walls, say a fire wall extends 4 ft. above the roof of the building and while we may have a roof fixture that keeps the wire 7 ft. above the roof would not keep it 7 ft. above this fire wall, so it was up to us to say whether this ordinance was intended to require the wires to be 7 ft. above the fire walls. Of course one of the purposes of the ordinance was to protect the fireman in his work and it would be a good thing to have all wires 7 ft. above these fire walls, but it is not practicable because it would require such tall and expensive roof fixtures. So we have been rather inclined to construe the ordinance as not requiring wires to be placed 7 ft. above fire walls.

Section 7 relates to poles. About the main provision in this is that it requires all poles to be painted, which is one of the things that we have not been able to enforce. The referendum ordinance only requires poles on graded streets to be painted. That is one of the things that gives us a great deal of trouble in trying to get poles painted. The companies and the city lighting department as well, do not seem to consider that it is worth spending money for.

Division 6, Section 7 is rather a peculiar one and is somewhat obsolete since it provides that no pole shall be set within less than 10 ft. of any gas lamp. There are no gas lamps in this city. The referendum ordinance provided that no pole shall be set within 10 ft. or less of a cluster light pole. That would be more up to date. It also requires that all poles shall be at least 5 ft. from any fire hydrant. Section 8 requires that all pins carrying wires of 600 volts or more shall be painted bright red.

Section 9 relates to grounding of transformer secondaries and is practically the same in both ordinances.

Section 10 gives the superintendent of public utilities power to condemn defective wires. Any wire which is considered dangerous to life or property must be condemned; it is made obligatory on his part to cut the wire from the source of electric energy when found to be dangerous and not repaired after 48 hours notice. The way it reads there is some question as to whether this would include telephone wires since it says that any and all wires or other apparatus used for electric purposes.

(To be continued.)

OREGON'S WATER RESOURCES, THEIR DEVELOPMENT AND USE.[1]

BY JOHN H. LEWIS.[2]

The streams of Oregon, if harnessed and put to work will furnish more than three million horsepower, and irrigate about three million acres of land according to the best available information. The total power from all sources used in Oregon today is probably less than 300,000 horsepower and the irrigated acreage as given by the U. S. Census is only 686,000 acres.

With these enormous possibilities for development it is no wonder that Oregon has taken the lead among all the states of the union in the enactment of beneficial water laws. Without positive laws protecting capital already invested or to be invested in works for the utilization of water, no substantial progress can be made. Colonists seeking irrigated land will avoid, as a plague, those states where the cost of litigation over water has in some cases exceeded the original cost of the works.

The experience gained thus far in this campaign for the development of our water resources indicates that, while far in the lead, we have yet far to go to reach the desired end. Most of the small and relatively cheap irrigation and power projects have been constructed. Only the large and complicated ones remain. The Carey Act and U. S. Reclamation Act are of little assistance to us primarily because little public land remains in any of these projects and further for lack of funds or lack of security upon which to raise funds. Because of the enormous cost in thoroughly investigating these projects, and the uncertainties and delay in organizing for construction, we find neither public or private capital interested in getting detailed information. Without this information the public is groping blindly in the dark as to the proper policies to pursue. Some of our state and national laws dealing with the water power question are believed to retard rather than stimulate development, and injure rather than benefit posterity.

Before outlining a plan whereby it is believed that this information can be secured without ultimate cost to the public, a brief report of progress will be made after which one large irrigation project also one large power project will be described so as to indicate the value to the public in adopting such plan.

Progress in Legislation.

The old method of government by injunction in water matters was put an end to by the enactment of a comprehensive water code in February, 1909. This limited franchises to the use of water for power purposes to forty years. It declares all water to be property of the public and creates a board consisting of the state engineer, and the superintendents of each of the two divisions into which the state is divided, to have charge of this property. Each of these officers has special duties to perform in addition to his board duties.

It is the duty of this board: (1) To determine and record all water rights initiated under early laws; (2) To grant rights to unappropriated waters for new uses; and (3) To protect all recorded rights by regulating diversions.

The U. S. District Court for Oregon after careful inquiry in the Silvies River case (199 Fed. p. 495) said:

"The Act of 1909 is in effect a proceeding on behalf of the state through an administrative or executive board to have judicially settled in an economical and pracical way the rights of various claimants to the use of the waters of a stream or source of supply and thus avoid the uncertainty as to water titles, and the long vexatious controversies concerning the same, which have heretofore greatly retarded the material development of the state."

One thousand and sixty-eight rights to water have thus far been defined and recorded under this law, affecting 116,686 acres of irrigated land on 15 different stream systems without a single appeal to he supreme court.

In the granting of permits, any proposed use which will menace the safety or the welfare of the public can be denied.

Out of 2680 applications, up to December 1, 1912, 1746 were approved, becoming permits. The estimated cost of works to be constructed under such permits amounted to $41,868,819 and the applicants paid the state $47,592 or $7,592 in excess of the appropriation for the expenses of the state engineer's office for four years.

The distribution of water for the protection of water rights appears to be giving general satisfaction. Except for a small deficiency in the appropriation for adjudication work, the legal end of the water right situation appears to be well taken care of.

Stream Surveys.

The important legal question as to how to secure protection for capital to be invested, has thus been answered. The next question which must be answered as definitely is, how much unappropriated water is there in the stream under consideration? The state is systematically making stream surveys in order to answer this question. It is equal to the difference between the total water supply and the extent of vested rights.

During 1912, a little over $56,000 was available for stream gaging work, the making of topographic maps and water power surveys in Oregon. The work is carried on in co-operation with the U. S. Geological Survey, each party contributing one-half the expense. This amount was allotted as follows:

Topographic maps	$30,000.00
Stream measurements	17,300.00
Deschutes water power survey	6,000.00
Chemical survey	2,700.00
Total	$56,000.00

During the past biennial period ending December 1, 1912, a total of $34,121 was expended on stream surveys in Oregon. Discharge records were obtained at 194 regular stations. Some of these records, however, extend through only a part of the year, depending upon the purpose for which the information is to be used.

The work is well distributed throughout the state and is designed to furnish the information needed for

[1]Presented January 16, 1913, before the Oregon Society of Engineers, Portland, Oregon. Published by the author's permission.

[2]State Engineer.

irrigation, water power and other investments so far as funds will permit.

On the Malheur, Owyhee and Umatilla Rivers we now have reliable records of stream flow extending over a peiod of nine years and for such streams as the Deschutes and a few others only seven years, while for the Columbia River, at The Dalles, we have a thirty-three year record. The available information at other points is as yet entirely too meagre to warrant the investment of large amounts of capital in works dsigned to fully utilize the available water supply.

Chemical Surveys.

The quality of water is of equal importance to quantity. Some waters upon being analyzed are found unfit for irrigation, domestic or certain manufacturing purposes. Daily samples have been collected at twenty-four points on twenty-one streams during the past year and analyzed in groups of ten. These results are of permanent value as the quality of water at different stages is approximately the same for no material change from year to year is possible in the geological formation of the watershed.

Topographic Maps.

In planning irrigation, power and other projects the relative position of the land with reference to the available water supply is of importance. Topographic maps are therefore a necessity in promoting development. They are of permanent value and can be used for many purposes.

The total area of the state is 96,699 square miles and up to date there has been mapped 20,581 square miles or about 21 per cent. Should work progress at the same rate as for the past two years, it is estimated that it will take about thirty-eight years to complete the map of the state, and about four years to complete the Willamette Valley.

Practical working maps are being prepared for the Willamette Valley. They are published on a scale of approximately one-half to the inch and show contours of five foot interval up to 450 ft. with ten foot contours above this elevation. This work is being pushed northward from Eugene and south from Portland. In the rolling country, in the vicinity of Portland, these maps will be published on a scale of one inch to the mile, and show 10 foot contours.

That portion of the Arlington quadrangle east of the John Day River was completed this fall, thus making available topographic maps for the entire John Day Umatilla Project, on a scale of two miles to the inch and showing 25 foot contours. These maps are sufficient for general studies and are intended only as a guide for the location of feasible projects and to aid in planning detailed investigations, the cost of which should in some way be assessed against the community benefited. This is one of the projects which should be investigated by the public.

The cost of topographic maps varies in each case with the character of country, weather conditions, etc., but for maps on a scale of two miles, one mile, and one-half mile to the inch respectively, for work in Oregon is approximately $10, $30 and $50 per square mile.

System Incomplete.

Thus far we have a well balanced system relating to water and water rights, and one which under ordinary conditions should suffice. But only the more expensive projects remain and private capital engaged in irrigation work has learned from bitter experience that the larger the project the less likelihood of making a profit. In the power field we find many new industries, which could utilize large quantities of cheap power, but which industries cannot pay large or even reasonable profits to private capital for furnishing the power. For these reasons, the promoter whom we have heretofore relied upon to supplement the general information collected by the state, with detailed surveys and to work up a comprehensive plan of development, is conspicuously absent. No man will expend $50,000 to $100,000 in preparing reliable plans for a project unless he can see sufficient immediate profit to enable him to enlist private capital in construction.

Private capital is thus denied an opportunity of even considering practicability of constructing large projects in Oregon and the public, without definite information, is unable to adopt any new policy for construction with public funds. We have tried to promote development by increasing the profit to the promoter until we have reached a point where the cost to the water user is so great as to make it impossible for him to live under the burden. It is a detriment to the state to assist in any development work where the settler is doomed at the outset to fail.

State Promoter.

It therefore appears that the next logical step to be taken in this campaign for the development of our water resources is for the state to undertake the promotion of specific projects, at least for those large irrigation and power projects which are beyond the reach of private capital.

The cost of such detailed surveys, plans, specifications and estimates of cost, can be made practically a lien upon the project or lands to be benefited by withdrawing the water necessary for carrying out the project until such time as the state is reimbursed.

With such detailed plans and estimates available to the public, private capital in all parts of the world will have an opportunity to figure upon the project, and the water rights could be assigned to the one offering to construct the project upon the most favorable terms. With the promoters profit eliminated it may be possible to interest private capital more easily in these enterprises.

If private capital cannot be interested, then we will have full information as a basis for adopting some new plan. If the project is constructed by public funds which can be attached as a lien, then the first payment should be to a revolving fund equal to the cost of the surveys, and such money used for the investigation of a new project.

Co-operation.

These investigations could be carried out by the state alone, or by the state in co-operation with the

U. S. Reclamation Service. Aside from the saving in cost, there are many advantages in co-operation. The past experience of the state in co-operation with the U. S. Geological Survey, and other government bureaus should commend this plan. Already the Secretary of the Interior has expressed a willingness to recommend that $50,000 be set aside for the investigation of the Deschutes Project, if the state will contribute an equal amount.

In order to give some idea as to the development which may result from the successful carrying out of this plan, one large irrigation, and one large power project will be described somewhat in detail.

Deschutes Valley.

In the Deschutes Valley approximately 65,000 acres is now irrigated where there is a possibility of irrigating over 500,000 acres. If, however, the railroad is allowed to be extended through the only logical reservoir site in the upper basin, this possibility will be greatly reduced. If power plants are allowed to secure vested rights immediately below such reservoir site, it would seriously complicate, if not largely defeat such development. Water right withdrawals, and a comprehensive plan of development even without such detailed investigations would be a valuable aid in promoting the highest use of our streams as the public would then be in a position to protect the public interest.

The John Day, Malheur, Silvies River and many other projects should be scientifically studied and promoted by the public. Each of these as well as many others are too large and complicated for private capital to attempt to organize, and therefore to thoroughly investigate. Definite detailed information should be had for at least one irrigation project before it will be possible for the public to adopt any new policy relating to irrigation.

Power.

It is believed that the most rapid, and perhaps the greatest development will come through the putting to use of our undeveloped water powers.

Within the past few years, many new industries have been developed wherein cheap water power is the controlling factor. Some of these new uses are as follows: The making of iron and steel in the electric furnace; the manufacture of fertilizer from the air; in wood distillation plants with charcoal as a by-product; the manufacture of calcium carbide, aluminum, carborundum, graphite, and other products. Many electro-chemical industries have also been developed in recent years requiring large quantities of cheap power.

Cost of Power.

Where it cost $30 to $45 per horsepower year to produce power in large blocks from steam, using sawdust as fuel, much power can be developed by water in Oregon at from $7 to $12 per h.p. year in the vicinity of the plant. To transmit this power any distance will add to this cost. Toronto, ninety miles from Niagara Falls, is now securing 10,000 h.p. at $16.50 from a public commission, which pays $9 for high tension power at Niagara Falls. In other words, it costs $7.50 per h.p. year to transmit 10,000 h.p. ninety miles. To distribute this from the substation in the city will add still further to the cost.

The public is entitled to have detailed and reliable information concerning these matters so vital to the development of our state. Heretofore, we have dealt with this subject in generalities.

It appears high time that we get down to something tangible and thoroughly study at least one irrigation and one large water power project.

Having such information we can then probably agree upon some comprehensive water power or irrigation policy which will be for the greatest good to the greatest number.

Columbia River Power.

What is believed to be the largest, and perhaps, the cheapest water project in the world is located in the Columbia River near The Dalles, Oregon. Competing transcontinental railroads are located on either side of the proposed project and navigable water is available from the foot of the power house to the Pacific Ocean, and for many miles inland.

The present channel of the Columbia River will be completely closed by the construction of a dam approximately 170 feet in height at the head of Five Mile Rapids and a new channel excavated in solid rock around the dam and controlled by a removable dam 70 ft. in height and 1400 ft. long. A canal on the Washington shore, 300 ft. wide and 1½ miles long, will convey water to the power house at Big Eddy where 300,000 electrical horsepower can be developed at a cost of $23,076,000 or $77 per h.p., with 236,000 h.p. additional, incidental to this development and available eight months of the year. The annual cost for furnishing low tension power at this plant is $6.80 per e.h.p. year, charging all expenses to the 300,000 h.p. of perennial power. As much as one million additional h.p. can be developed at this plant at a cost of $44 and furnished at cost for about $4.50 per h.p. year.

Assuming that high tension power can be furnished at the plant for $9, a 27,000 h.p. block can be delivered in Portland for $14.40 per h.p. year, or approximately the wholesale rate at Niagara Falls.

It is believed that 240,000 h.p. from this plant can be disposed of at $9 per year, for the making of fertilizer from the air. This sale alone will fully meet all operating and overhead charges for the construction of the entire plant, leaving net profit to the state, any revenue obtained from the remaining 60,000 h.p. and 236,000 h.p. of part time power.

It has been recommended that the legislature appropriate $50,000 for the investigation of the Deschutes Irrigation Project, in co-operation with the Secretary of the Interior who has expressed a willingness to recommend the expenditure of an equal amount by the U. S. Reclamation Service; also that Oregon, Washington and the United States co-operate in the preparation of final plans for the Columbia River power project, costing perhaps $50,000. With this information it is believed that the people will have no difficulty in agreeing upon some definite irrigation and power policy for the state to pursue.

ELECTRICAL PUMPING AND IRRIGATION

DESIGN OF DIVERSION WEIR.

BY B. A. ETCHEVERRY.

The design of diversion weirs will depend on the type of weir and the local conditions, but there are static and dynamic forces common to all types of weirs. To consider these forces the weirs may be grouped into two classes: (1) those on impervious foundations such as bedrock not fissured, or on impervious clays; (2) those on pervious foundations of silt, sand or gravel.

Forces acting on weirs founded an impervious foundations.

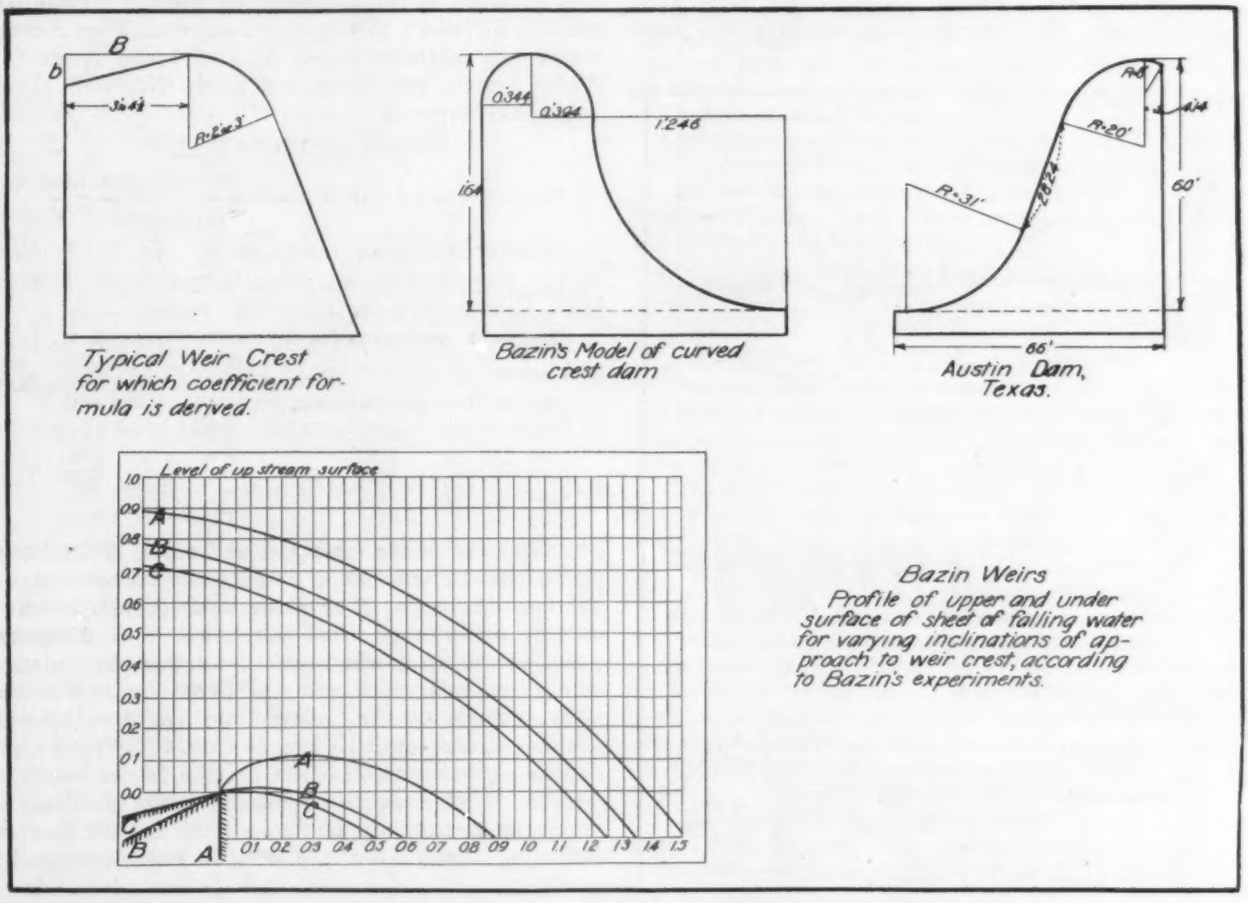
The dynamic forces are:

1. The erosive or scouring force on the downstream side of the weir produced by either the high velocity or by the impact of the water passing over the weir crest.

Downstream erosive or scouring force.

This force may act on the downstream face of the dam and also on the stream bed below. To resist it the following types of construction have been used, either singly or in combination:

1. Use an Ogee face on downstream face of dam, to prevent impact of water.
2. Use a flat rollerway for the downstream face of dam.
3. Use a series of steps for the downstream face of dam.
4. Use a strong apron which will resist the impact and destroy velocity.
5. Use a water cushion into which the water falls.
6. Use an apron of riprap or paving to protect stream bed below.



2. The force of impact of ice, trees, etc., on the upstream face of the weir.

The static forces are:

1. The normal water pressure on the upstream face.
2. The normal water pressure on the downstream face due to back water.
3. The weight of water supported by the crest.

Forces acting on weirs founded on pervious foundation.

The dynamic and static forces include in addition to those stated above the following underflow forces:

1. The transporting and erosive power due to the underflow in the stream bed under the weir floor.
2. The upward static pressure of the weir floor produced by the water under the weir.

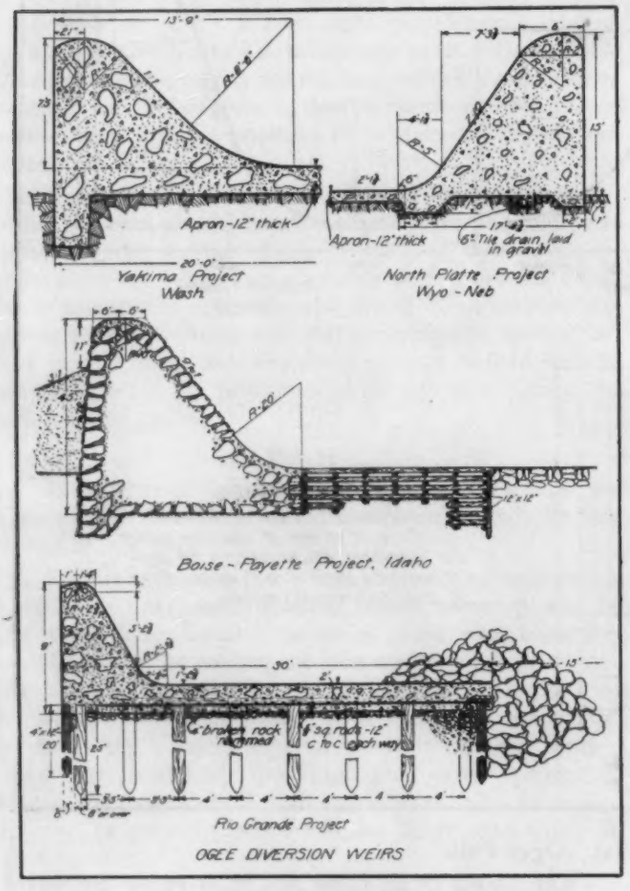
1st. Ogee Fall.

The object of an Ogee fall is to guide the water and give it nearly free fall down to a certain point and then make it flow on a curve so as to change the direction of flow gradually and discharge it parallel to the stream bed usually with a high velocity. The part of the downstream face, from the crest down to the point where the falling water changes its direction of fall, is made to fit rather closely the curve of falling water, being made flatter to prevent the formation of a vacuum under the sheet of water. The equation of the curve, which is a parabola, is

$$y = \frac{g}{2v^2} x^2$$

Where v = velocity of water over the crest at the crest y = ordinate corresponding to abscissae x, both measured from the origin of curve of falling water.

To determine the velocity (v) it is necessary to know the discharge and the exact water cross section (A) directly at the weir crest, when these are known $v = \frac{Q}{A}$. As the discharge Q and the length of weir crest are known for the case considered, the only remaining factor to be known is the depth of water at the weir crest. The depth of water obtained with the weir formula, generally used, is the difference in elevation between the weir crest and the water level measured at a point some distance upstream from the weir crest, before the water level begins to drop. From this point down the water level drops on a curve, so that the depth of water on the crest (D) is considerably less than the head of water (H) used in the weir formula.



OGEE DIVERSION WEIRS

The weir formulae most generally used are the following:

East Indian Engineer's formula:

$$Q = CLH^{3/2} \text{ where } C = 3.4989 - .0535\,H.$$

This formula provides no correction for velocity of approach.

Bazin formula:

$$Q = \left(0.405 + \frac{.0984}{H}\right)\left(1. + 0.55\frac{H^2}{(p+H)^2}\right) LH\sqrt{2gH}.$$

This formula considers velocity of approach.

Francis formula:

$Q = CLH^{3/2}$ (no velocity of approach).

$Q = CL\,[(H+h)^{3/2} - h^{3/2}]$ (with velocity of approach).

In the formula the following notation has been used:

p = height of weir in feet (used in Bazin's formula only).

H = measured head in feet or difference in elevation between weir crest and water level, at a point sufficiently far upstream to avoid the surface curve. A distance from the weir crest to the point of measurement equal to 2½ times the height of the crest of the weir above the bottom of the channel is recommended by Boileau.

h = head in feet corresponding to velocity of approach.

L = length of weir crest in feet.

C = coefficient of discharge.

Francis formula is the one most generally used in the United States. In this formula the value of the coefficient, which depends on the form of weir crest and depth of water, varies from about 2.5 to 4.5 and mostly between 3.00 and 4.00. The following formula has been deduced by U. S. Geological Survey for the coefficient for weirs of Ogee section, with 2 or 3 crest radius and upstream slopes 3 to 4.5 broad (page 131 Water Supply and Irrigation paper No. 200, U. S. Geological Survey.)

$$C = (3.62 - 0{:}16\,(S-1))\,H^{1/20}$$

Where S = batter ratio of the slope $\frac{\text{horizontal run}}{\text{vertical rise}} = \frac{B}{b}$

Measurements of discharge by the U. S. Geological Survey over an actual Ogee Dam, (Austin Dam, Texas) gave the following results:

Discharge coefficients for the Austin, Texas, dam:

H	D = depth at crest.	Ratio $\frac{D}{H}$	Average value of C
.42	.33	.79	3.112
.72	.625	.87	3.053
1.09	.838	.77	3.132
1.32	.96	.727	3.302
1.54	1.04	.717	3.333

With the above formulae, and value of discharge coefficient the value of H is obtained for any corresponding discharge. The value of D (depth of water directly on crest of weir) is required to find the velocity at the crest which will determine the equation of the parabola. The value of D as obtained by the measurements on the Austin Dam, expressed in percentage of the depth H, ranges from 87/100 for small depths of water to 71.7/100 for the larger depth of water. Measurements on curved crests of dams of similar form made by Bazin on small models give the following results for one of the most comparable models:

Head	Depth on crest	$\frac{D}{D}$
.305	.239	.78
.574	,433	.75
.820	.604	.74
.089	.820	.75

On the other models of curved crests the results obtained by Bazin are very nearly the same. (Annales des Ponts et Chaussees, Vol. 2, 1898, p. 151-264) Other measurements of profiles of the sheet of falling water are reported on pages 111, 112 of the U. S. G. S. Water Supply paper No. 200. On flat crests weirs, 6.56 and 6.89 ft. wide, and for maximum heads of

water of 5.15 and 4.65 ft. respectively, the ratio of $\frac{D}{H}$, where D is measured at the center of the crest was .61, for both weirs, and where D is measured at the downstream edge of the crest, the ratio was .43 and .45 respectively. For a flat crest dam 8.42 ft. wide (Cleggs Dam, North Carolina) Edwood Morris, for a head of 1.25 ft. obtained the ratio. 40.

As it is important, in order to prevent a vacuum under the sheet of falling, to determine the profile of the sheet of falling water for maximum flow condition when the curve is the flattest, it will be best to assume that the depth of water on the crest of an Ogee dam properly curved will be 65 per cent of the head H.

From the equations given above, we then have for the velocity at the crest:

$$v = \frac{Q}{A} = \frac{CLH^{3/2}}{\frac{65}{100}L - H} = \frac{100}{65} CH^{1/2}$$

and

$$y = \frac{g}{2v} 2x^2 = \frac{.21\,g}{C^2 H} x^2$$

approximately,

$$y = \frac{6.75}{C^2 H} x^2 \qquad x^2 = \frac{C^2 H}{6.75} y$$

This equation for the parabolic curve is based on the average velocity of the water cross section at the crest of the weir. Adopting the well accepted principle, that the thread of mean velocity is two-thirds below the surface, the origin of the curve will be at a point directly above the crest at a height equal to 1/3 of the depth of water at the crest (or $\frac{D}{3}$). This curve, when plotted, will represent the thread of mean velocity of the falling sheet of water. The upper surface curve and under surface curve which form the boundary of the water sheet will be obtained by finding the thickness of the sheet at any point and plotting the points of the upper surface and under surface curve, at right angles to the mean velocity curve, at distance equal to 2/3 and 1/3, respectively, of the thickness of the sheet. The thickness of the sheet at any point is found from the discharge per lineal foot of crest divided by the velocity at that point which is the resultant of the constant initial horizontal velocity and of the vertical velocity due to gravity. ($\sqrt{2gy}$, where y = vertical distance below origin).

The profile of the sheet of falling water shows the shape which the upper part of the downstream face the Ogee dam must be given to prevent the formation of a vacuum between the sheet of water and the face of the dam. It is safer to flatten the profile of the dam so that it will extend well into the falling sheet; in some cases this is also necessary to satisfy the conditions of stability. To facilitate the construction of the Ogee curve, the downstream face is usually shaped by means of circular arcs and tangents, which are fitted to the theoretical profile. Where the vertical upstream face of the weir forms a right angle with the crest, there is full contraction of the under surface of the sheet of water, which causes, according to Bazin's experiments, a maximum rise in the surface equal to about 1/8 of the head of water at a distance of about 1/4 of the head. This contraction is nearly eliminated by making a battered approach to the crest of the weir of 1 vertical to 4 horizontal. To eliminate this contraction, which will cause a vacuum, it is desirable to shape the crest of the dam with such a battered slope between the upstream vertical face of the dam and the summit of the weir crest, or to use a suitable curve which will fit this contraction. The profiles of the upper and under surface of a sheet of falling water, passing over a sharp edge crest, for a verticle crest and also for downstream inclinations of 2 horizintal to 1 vertical, and 4 horizontal to 4 vertical, as obtained by Bazin are shown in the accompanying diagram.

SOCIETY FOR ELECTRICAL DEVELOPMENT, INC.

A meeting of the Society for Electrical Development, Inc., was held January 14, 1913, at the Engineering Societies Building, New York City. At this meeting the various work done by the organization committee was approved as were also the by-laws of the new society.

Immediately after the meeting of the society, a further meeting was held by the board of directors, who were selected by the associations which they represent from the various branches of the industry. The complete board is as follows, Mr. Doherty being elected president:

Henry L. Doherty	Gerard Swope	W. W. Low
Ernest Freeman	J. R. Strong	F. S. Price
A. W. Burchard	A. C. Einstein	Roger Scudder
W. H. Johnson	J. E. Montague	Earnest McCleary
J. R. Crouse	J. F. Gilchrist	P. N. Thorpe
W. E. Robertson	B. M. Downs	G. M. Sanborn
L. A. Osborne	W. A. Layman	

The first nine gentlemen compose the executive committee, on whom will lay the heavier responsibilities of the further organization work of the society. They have advanced sufficient funds for carrying out the organization work.

The society has the endorsement of the executive committees of the National Electrical Contractors' Association, the National Electrical Supply Jobbers' Association, the Executive and Public Policy Committees of the National Electric Light Association, together with the support of a large number of manufacturers, both large and small. With such endorsement there can be very little question of its practicability and value to the industry at large. The work of the society will be devoted to various lines of effort for the greater development of the electrical industry at large and will be carried out along broad gauge lines, aiming to increase in every way the uses of electricity, especially for light, heat and power.

The membership of the society as stated in the by-laws is open to every interest in the electrical industry and the subscriptions based upon a small percentage of the gross business are so small individually, that it is believed that the full co-operation of every concern in the electrical industry can be secured.

PROGRESS IN GENERATING UNITS.

Horizontal units are being built of 15,000 and 20,000 kilowatts capacity for speeds of 1800 r.p.m. and 1500 r.p.m., and even larger high speed units are contemplated. Single turbine generators of 30,000 kilowatts capacity for speeds of 1500 r.p.m. or 1200 r.p.m. for 25 cycle and 60 cycle service, respectively, are a possibility of the near future. Modifications of design have been offected whereby the materials used are not stressed materially harder than in smaller units.

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CONTENTS

A Modern Electrical Supply House 79

A Diesel Engine for Central Station Service on the Pacific Coast 86
By J. W. White Jr.

New Traffic Ordinance at Portland 88

Myriawatt 88

Muncipal Ordinance on Wiring 89
By H. Joslyn.

Outside Wire 92
By J. J. Wettrick.

Oregon's Water Resources—Their Development and Use ... 94
By John H. Lewis.

Design of Diversion Weir 97
By B. A. Etcheverry.

Society for Electrical Development 99

Progress in Generating Units 99

Editorials 100
The Arbitrary Telephone Rate.
The Dangers of the Company Section.
The Efficiency of Demonstration.

Personals 102

In Memoriam 102

Meeting Notices 103

News of the San Francisco Electrical Contractors 103

Trade Notes 103

News Notes 104

The Arbitrary Telephone Rate

Any attempt to fix an arbitrary rate by legislation without due attention paid to the fundamental principles of rate fixing involved, is clearly an erratic procedure which may prove unjust to all parties concerned. Even though such an arbitrary fixing may never be upheld by the courts, yet such an agitation jeopardizes the standing of the utility securities in a manner that is positively unjustifiable. In practically every commonwealth of the West, regulating commissions have been fully empowered to handle such issues in a reasonable manner wherein rates may be determined according to scientific methods just both to people and utility company alike.

Some over-zealous citizens of San Francisco propose to legislate a flat rate for telephone service. Such procedure can but wrongly injure the securities of a great utility without accomplishing good.

The issue is clear. So much actual invested capital is represented in the telephone securities. On this money the utility is entitled to a reasonable return and the people, in exchange, are entitled to an adequate service. Regulating commissions throughout the West should get at the true status of affairs and, knowing the true status, act with the strong arm of the law. For common justice to all it would seem, then, that the commissions ought at once to get busy. Neither an excited public opinion nor a possible influencing corporate interest should in any manner be suffered to alter a result which may be determined with scientific accuracy.

The question of telephone rate-fixing is not one of local interest. Its sphere of action is nation-wide. The recent movement of the United States Attorney General in directing the Interstate Commerce Commission to investigate telephone rates will indeed be awaited by all with the keenest interest.

The Dangers of the Company Section

The acquiring of knowledge is a subtle phenomenon. The patient and the studious absorb without prodding, while many devoid of outward studious appearances nevertheless, by god-given powers of observation and application, soon become masters in theory and practice. Such, however, are the exceptions. Knowledge to be generally disseminated must be presented in such a manner that the words of wisdom fall upon willing ears.

The symposium, or the intellectually drinking together of congenial spirits, is indeed the acme of methods to be employed in the dissemination of useful knowledge among the employes of the modern utility company. A collection of comments or opinions thus brought together becomes invaluable. Especially is this true where several brief essays or articles are contributed on the same subject by different writers, engaged in similar work but occupying varying fields of experience. The specialized activities of the day call for experiences compiled from an ever widening field of action. Often, for instance, in one district of an hydroelectric network, serving many communities, an intricate problem is encountered in distribution which may at once be solved by applying methods that were used in solving identically the same problem in an-

other portion of the same system. A symposium of all engaged in directing the distribution of the company thus makes impossible the reduplication of effort.

The monthly managerial conferences now instituted in practically all the larger utility companies of the west are indeed immeasurably simplifying the titanic burdens of utility action. Now comes the second stage of conference—that in which the technical employes are invited to gather in monthly meetings for the discussion of technical subjects involved in the various phases of their work. Such sections may prove of immeasurable benefit to a utility, not the least of which will be found in expanded loyalty for the utility they serve. Two dangers, however, should be carefully guarded against: a tendency which may tend to narrow or inbreed and again, a possible feeling of compulsion in attendance by the authorities of the company.

The first danger arises from the fact that a technical organization composed of only company members is familiar with experiences of its own creation alone and may be lacking in the broadening influence gained by association with those working along parallel lines in other utility companies. Such an influence may become narrowing and result in what stockmen call "over in-breeding."

Again a delicate point is to be handled in regard to the feeling of the management toward attendance. Fifty per cent of the resulting good is lost when a member must feel that his attendance is anything but optional. The member must feel that although the executives are anxious to build up technical discussion among the employes still there must be a reasonable latitude within which the technical employe must have full and complete freedom from duty. In a word recreation and not fulfillment of duty should hold his constant attendance.

To prevent both these deadening influences from being felt the program committee should exercise considerable sagacity in the choice of leaders in discussion and in the selection of topics. An occasional speaker from an outside or competing company will do much to broaden the general atmosphere. On the other hand the selection of live interesting questions for discussion will bring the member at the meeting without any further pressure. His horizon is thereby numerically widened and keen interest holds the punctual attendance.

The Efficacy of Demonstration

Every competent salesman follows six general steps in consummating a sale. First, there is the opening chat which wins the prospect's attention and prompts him to look further into the proposition offered. Then comes the lucid description and explanation which still further gains the prospect's interest by picturing the proposition in his mind. On the heels of this lucid, specific description, argument or proof follows, which creates a desire for the article that the salesman has to sell by showing its value and advantages. Then comes the subtle persuasion of the gifted salesman which draws the prospect to his way of thinking by showing the adaptation of his particular make of article to the needs of the prospect and that the prospect needs it now. The fifth step is the inducement offered which gives the prospect a particular or extra reason for buying. And, finally comes the climax or clincher, which by its subtle psychological effect, makes it easy for the buyer to order and prompts him to act at once.

Any abrupt procedure in the steps outlined above often proves fatal. The psychology of salesmanship is indeed delicate in operation. Interest—live, understanding interest—kept alive throughout the alert argument of the salesman is a wonderful aid in netting returns.

In the selling of electrical goods to the layman, a lack of knowledge of the actual appearance and workings of a particular appliance kills many a desire to purchase existing in the mind of a buyer. Electrical devices at best are not generally understood. Wide-awake central station managers have in recent months fully evidenced their convictions on this point. This is seen on all sides in the attractive show counters and windows maintained by them so that patrons may be fully educated in modern electrical conveniences.

Not only have the central stations awakened to the efficacy of demonstration but the jobber who wholesales his equipment has also come to a keen realization of its possibilities. Our leading article of this issue is devoted to a description of the new home of one of the largest electrical jobbing houses on the coast. The structure is indeed a masterpiece of forethought looking to results to be anticipated from forceful presentation, accomplished by exhibiting standard products actually installed throughout the building.

The passerby is first attracted by looking into the main display, which fronts on one of the principal streets of a great city. Many forms of modern electrical appliances are seen from the window, installed in various parts of the room. This entire exhibit is raised to meet the convenient glance from the observer. Hence there is no show window proper, for the entire room itself is thus made to act in this capacity. Upon entering, the interest of the prospect is at once aroused by observing in minute detail the particular article desired. If interested, for instance, in bushings, or various types of wiring, all standard makes carried by the firm may be observed actually installed in various parts of the edifice. On the other hand, should electric appilances be the thing in which the prospect is most interested, not only may they be seen in profusion in the several display rooms but the company has installed a complete equipment in the suite of rooms used by its women employes during the recreation hours of the day. Automatic elevators, both freight and passenger, bespeaking the last word in invention, may also be seen in operation and inspected in every detail. Indeed the entire equipment from fuse blocks to automatic fire sprinklers is a remarkable accomplishment and emphatically voices the power of demonstration.

PERSONALS

ITEMS FOR THIS DEPARTMENT ARE SOLICITED FROM ALL READERS

Ralph D. Mershon, president of the American Institute of Electrical Engineers, is at San Francisco.

L. C. Lull has been elected president of the A. I. E. E. student branch at Stanford University, California

H. E. Plank, steam turbine expert with the General Electric Company, has returned to Portland from San Francisco.

R. W. Bigelow Jr., vice-president of the Acme Electric Heater Company of Detroit, Mich., is visiting the trade at San Francisco.

E. R. Whitney, sales engineer with the General Electric Company, has returned to Portland from a month's trip to California.

Gustav Wade, a recent graduate of Stanford University, is now with the Yakima Valley Transportation Company, at North Yakima, Wash.

W. W. Hanscom, consulting electrical engineer at San Francisco, has been appointed alternate statesman of the Jovian Order for California.

C. E. Allen has been appointed assistant manager of the detail and supply department of the Westinghouse Electric & Manufacturing Company, at East Pittsburg, Pa.

N. I. Garrison has arrived at Stockton, California, to assume his duties as auditor of the Western States Gas & Electric Company. For eight years he was auditor of the Fort Smith Light & Traction Company.

E. B. Strong, president of this journal and Pacific Coast master of transportation for the N. E. L. A. convention at Chicago in June, 1913, is attending the meeting of the transportation committee at New York City.

J. W. E. Taylor, formerly with the engineering department of the Great Western Power Company, has joined the engineering staff of the Oro Electric Company at San Francisco and will have virtual charge of engineering operations.

Charles F. Scott has been appointed first vice-president of the A. I. E. E. executive committee on organization of International Electrical Congress at San Francisco in 1915, this appointment following the resignation of **W. D. Weaver.**

Henry A. Lardner, Pacific Coast manager for J. G. White & Company has been transferred to the grade of Fellow in the American Institute of Electrical Engineers, **Charles F. Conn,** of the same company, having been transferred to the grade of Member.

M. M. O'Shaughnessy, City Engineer of San Francisco, and **A. W. Maltby** have been selected by the Department of the Interior as Commissioners to decide the dispute between the Reclamation Service, Lake Tahoe property owners and the Truckee River General Electric Company, concerning the diversion of waters from Lake Tahoe.

T. E. Fogelsang, formerly superintendent of the Pacific Gas & Electric Company's Station A at San Francisco, has been appointed assistant manager of the company's operation and maintenance department, steam section. **C. A. Eastwood** has been made superintendent of Station A. **J. W. Varney** has been placed in charge of Stations E and H, in addition to the other substations of which he is superintendent.

Philip S. Dodd has resigned as director of the commercial development department of the National Quality Lamp Division of the General Electric Company to accept the appointment of secretary-treasurer of the recently organized Society for Electrical Development, Inc. **J. M. Wakeman** has been appointed general manager of the Society. Both Mr. Dodd and Mr. Wakeman are well known in the electrical industry and have a most intimate acquaintance with publicity problems of the kind involved in the present propaganda on behalf of electrical development.

IN MEMORIAM.

In the death of Prof. T. S. C. Lowe, at Pasadena, Cal., on Thursday, January 16, 1913, the world has lost one of its greatest scientists, whose inventions have benefitted millions of people. He made many fortunes and spent them all in the development of epoch-making discoveries which were potent factors in the advancement of civilization. Professor Lowe was a genius of giant intellect, whose ideas were far in advance of his time, and the world is better for his having lived in it.

Born in Jefferson, New Hampshire, August 20, 1832, his boyhood days were spent among the hills of New England, where his talent for invention early developed. He claimed to have but a common school education, but it might better be said that he learned those things which he needed to know, for in later life he had a profound knowledge of the sciences beyond the scope of teachers. His mind seemed to have a power like the Roentgen Ray for penetrating the mysteries of nature's forces, which were opaque to the mind of his contemporaries.

His earliest work was in the field of aeronautics and in 1860 he constructed the largest balloon ever made (The Great Western), its capacity being 725,000 cubic feet of gas. This work was prompted by a belief that the study of the air currents would lead to some method of forecasting the weather, and was the germ which eventually developed into the present United States Weather Bureau. His balloon ascensions confirmed his belief in the existence of an upper air current, invariably flowing in an easterly direction.

During the war he offered his services to the Government and made nearly three thousand ascensions. He invented a system of signalling from the air and also the aerial telegraph. He served through the campaigns from Bull Run to Gettysburg and eminent military strategists have given him the credit of having turned defeat into victory by his skill and bravery.

Immediately following the war he invented the first artificial ice machine and applied the invention to the refrigeration of rooms, and he equipped the first vessel used as a refrigerator ship. This was in 1866, and the value of the invention was so little understood that not until long after the expiration of his patents for the process of ice-making did the world awaken to its wonderful possibilities. All of the present systems of refrigeration and artificial ice-making were anticipated by Prof. Lowe's genius and are built on the foundation which he so ably prepared.

A history of his life would be a continuous chronicle of surprising discoveries and useful inventions culminating in 1873 with the crowning achievement of his career, a method of manufacturing water gas. The vast economies resulting from this invention and its application to the pressing needs of the world for heat and light, placed the name of Lowe among those of the few great scientists who have done things for humanity that will never die.

Prof. Lowe made a justly deserved fortune from his water gas inventions, but all of this wealth was used in the construction of the Mt. Lowe Railway and the establishment of the Lowe Astronomical Observatory in Southern California.

On June 16, 1894, Prof. Lowe was elected an honorary member of the Military Order of the Loyal Legion of the United States in recognition of valuable services rendered by him to the Government during the war for the suppression of the rebellion. Prof. Lowe was a charter member, and the first honorary member of the Pacific Coast Gas Association, having been unanimously raised to the position of honorary member on July 17, 1901. He was beloved by his friends. The seeds of wisdom he planted will never die, and the monuments erected by his genius will make his name immortal.

E. C. JONES.

January 21, 1913.

MEETING NOTICES.

Seattle Section, A. I. E. E.

The January meeting of the Seattle Section was held Saturday evening, January 18th. A paper on "Electric Welding" was presented by Mr. W. M. Price, giving a review of the various systems in successful use, together with operating information and cost data.

Electrical Jobbers.

The next meeting of the Pacific Coast electrical jobbers will be held at Del Monte, Cal., February 27, 28 and March 1. This will be one of the most important meetings ever held, General Secretary Franklin Overbagh and General Counsel Thomas Debevoise being expected to be present.

San Francisco Jovian Club.

A large and enthusiastic luncheon of the San Francisco Jovian Club was held at Tait's cafe on January 21st. Aside from the usual routine business a spirited discussion was held on the question, "Resolved that it is for the good of the Jovian Order that a limited amount of wine be served at rejuvenations." The negative was so vigorously upheld by W. L. Goodwin and A. E. Elliott that the substitute speakers on the affirmative, G. I. Kinney and A. H. Halloran, finally added their arguments and votes to make the decision unanimous in condemning the use of any liquor at rejuvenations. Announcement was made of the plans for the reception and entertainment of Frank Watts, National Jupiter, upon his arrival at San Francisco on June 3. A. M. Alvord, presided. Talks were also given by T. E. Bibbins and H. V. Carter on the high standard now set by the Jovian Order

Oregon Technical Club.

The Oregon Technical Club luncheon on January 14th was presided over by H. R. Wakeman, chairman of the local section of the A. I. E. E. The speaker of the day was L. B. Wickersham, chief engineer of the United Railways. His subject was "Water Resources of Oregon and Railway Electrification of the Willamette Valley."

He gave a brief summary of the water powers of Oregon and stated that the "Clear Lake development" of the Hill interests was one which promised to be a very interesting one, the availabe head being 1100 feet and the amount of water 300 to 400 second feet. The speaker made it very clear that Oregon led all the States of the Union in 1912 in the amount of interurban electric railway trackage installed, there being laid in the year 1912 eight-five (85) miles of interurban track, electric Pullman service being now maintained between Portland and Eugene, at night sleeping accommodations being provided. He also paid a glowing tribute to 1200-volt d.c. systems for interurban service.

NEWS OF THE SAN FRANCISCO ELECTRICAL CONTRACTORS.

Geo. H. Duffield, special representative of the National Electrical Contractors' Association, has been in San Francisco for the past week calling on members of the National Association, keeping them in touch with the work the National organization is doing to place electrical contracting on a higher plane and to improve trade conditions. He also is explaining the literature and data furnished by the National to its members, which is really a tangible benefit of membership.

The California State Association of Electrical Contractors will hold its annual meeting at Santa Barbara, Cal., August 13, 14, 15, 16, 1913.

The annual election of officers was held by the S. F. D. L. No. 1, C. S. A. E. C, and the following were elected to serve for the year 1913: C. F. Butte, Butte Eng. & Elec. Co., President; L. R. Boynton, Central Elec. Co., Vice-President; W. S. Hanbridge, Secretary-Treasurer; W. D. Kohlwey, W. D. Kohlwey Company, Sergeant-at-Arms. The members then listened to an instructive address given by Mr. Chas. Wiggin of the Dunham, Carrigan & Hayden Company, on the subject of Credits. Mr. Wiggins was well able to handle the subject, as he has been connected with the contractors, jobbers and manufacturers for many years. Mr. Albert Elliot has been selected by the State License Committee of the California State Association of Electrical Contractors to draft and take care of a State license law, a copy of which will appear in the next issue of the Journal.

TRADE NOTES.

The Tacoma Wood Pipe Manufacturing Company, Tacoma, Wash., has succeeded the Tacoma Wood Pipe Company. B. O. Skewis is manager.

Mathias Klein & Sons have made arrangement to manufacture and market the "Eichhoff Line-builders Wire Reel." The reel combines a take-up and pay-out reel in one.

The San Francisco offices of the Bryant Electric Company have been moved from 609 Mission street to more convenient and commodious quarters in the Greenwood Building, at New Montgomery and Minna streets.

Westinghouse, Church, Kerr & Co. are acting as engineers and constructors for John Coughlan & Son in Vancouver, B. C., in the design and construction of a pile pier 690 x 60 ft. and a structural steel shop of timber 360 x 55 ft., with crane runway, together with heating, lighting and plumbing facilities.

The Standard Underground Cable Company of Canade, Ltd., has established new branch offices at Montreal, Quebec, and Winnipeg, Manitoba, in order to facilitate the prompt handling of their growing business. Business originating in the province of British Columbia and Alaska and Yukon Territories will be handled by the Seattle, Wash., office of the company, and business from the Maritime Provinces will be handled by the Boston, Mass., office. This is a temporary arrangement in order to secure prompt service immediately for customers in those districts until the volume of business justifies the establishing of separate offices in the Dominion. The establishment of these branch offices puts the Standard Underground Cable Company of Canada, Limited, in an excellent position to handle with accuracy and dispatch all business which they may secure.

The Salt River Valley Water Users' Association of Phoenix, Arizona, have recently contracted with the Pelton Water Wheel Company to furnish from their San Francisco shops all of the hydraulic apparatus for the "Cross Cut" power plant near Tempe, Arizona. This involves six vertical 1000 h.p. Pelton-Doble tangential water wheel units to be direct connected to Westinghouse alternating current generators, vertical type. Also two 300 h.p. vertical shaft Pelton-Doble impulse units for direct connection to the exciters. The operating head will vary from 117 to 120 ft. and the water will contain at times considerable salt and more or less sediment in suspension. The rotating speed for the vertical alternating wheel units is 94 r.p.m. Because of the comparatively low head and the unit size of the machines, this slow speed was decided upon by the engineers and will necessitate several nozzles each discharging upon a single Pelton-Doble runner for each unit. The hydraulic machinery of this particular power plant will involve a number of new and novel features and the Pelton Company's arrangement was found to be the best adapted to these particular conditions where it was necessary to minimize the damage from salt and silt in the water, and to insure continuous operation. Otherwise, turbines running at a much higher speed could have been employed, resulting in a lower first cost for the installation.

NEWS NOTES

ILLUMINATION.

MARYSVILLE, CAL.—The Oro Electric Corporation has been granted a 50-year franchise in the county of Yuba.

OLYMPIA, WASH.—The Wilbur B. Forshay Company's application for an electric light franchise has been denied.

EI SEGUNDO, CAL.—Sealed bids will be received up to January 27th for installing necessary equipment and lighting with electric lights certain streets in El Segundo.

PORTERVILLE, CAL.—Officials of the Central California Gas Company have made application for a franchise to lay their distribution pipes along various county roads.

LA MESA SPRINGS, CAL.—The San Diego Consolidated Gas & Electric Company has secured right of way from East San Diego to La Mesa, and will commence work in the near future to install a 4-inch high pressure gas main.

NEW WESTMINSTER, WASH.—The city council has entered into a contract with the British Columbia Electric Railway Company for a supply of electric current to the city for eleven years. The company named will build a new substation at Sapperton.

VANCOUVER, WASH.—The two franchises asked by the Northwestern Electric Company, one to operate a street car line and another to run a light and power company, were laid over by the council and will be acted upon at a special meeting to be called some time in the near future.

PORTLAND, ORE.—State Senator Isaac N. Day will introduce a bill in the state legislature providing for developing of approximately 100,00 h.p. by harnessing the Columbia River above Celilo Canal, the project to be prosecuted and operated by the states of Oregon and Washington, for the benefit of municipalities tributary to the river.

STOCKTON, CAL.—The Stockton Gas & Electric Corporation's first mortgage, 6 per cent bonds of the issue of 1909, due 1934, have been called for payment on January 1, 1914, the first callable date under the mortgage, at 105 and interest, at the Mercantile Trust Company. The trust company will pay any of said issue at 106, if presented before January 1, 1914.

KELSO, WASH.—The Washington-Oregon Corporation has been granted a franchise over the county roads from Kelso to Castle Rock on the west side of the Cowlitz River for the construction of an electric line for power and lighting purposes. B. H. Atkins, local manager for the Washington-Oregon, states that work will go ahead at once on the construction of this line.

SPOKANE, WASH.—Extensions and improvements by the Spokane Gas Company contemplated for 1913 and already under way, call for an expenditure of $120,000. A. N. Cantrill, manager of the company, announced the letting of the contract of $20,000 for electrifying the steam-driven machinery at the gas plant. The contract for electrical energy goes to the Washington Water Power Company.

TRANSMISSION.

PITT LANDING, B. C.—The Western Canada Power Company will erect a steel tower on the south side of the Canadian Pacific railroad tracks here.

TACOMA, WASH.—The Chicago, Milwaukee & Puget Sound Railway will build a power house on the tide flats at a cost of $5000. Work will be done by the company's crews.

REDLANDS, CAL.—Engineers of the Edison Company are preparing surveys for building a high power line from Redlands to Yucaipa valley, work to start at once, as company has contract to furnish power by March 1st.

THE DALLES, ORE.—Announcement has been made by the Pacific Power & Light Company for a plan of materially increasing the power developments at Hood River and work will soon be underway on a new 700 horsepower plant which will cost approximately $500,000. This plant will be located a short distance above the O. W. R. & N. bridge at Hood River and almost within the city limits.

SALT LAKE CITY, UTAH.—An application has been filed with the state engineer for the appropriation of 2370 second feet, 1,715,000 acre feet of water daily from the Green River for power purposes. The application was filed by Thomas W. Cameron, Theodore J. Winkelar, Frank D. Wyant and other St. Louis capitalists. They plan to organize a power company to distribute power throughout Utah.

WALLA WALLA, WASH.—Plans for a 2000 horsepower hydroelectric power plant to be built on the Walla Walla River seven miles above Milton, Oregon, are being made by Milton men, who own Walla Walla River land. The men interested in the company are: C. E. Demaris, Amos Demaris, Harry Huber, John Ross, J. A. Hayton, Henry Hopkins, Jake Demaris, Sherman Mizer, H. Rhuberg, Chas. Heathington, C. Wallace and N. T. Manola.

LOS ANGELES, CAL.—An amended offer to purchase on a meter basis all of the power that may be generated by the aqueduct power plants has been submitted to the city council by the three local power companies. Recently the city authorities turned down the offer of the companies to pay the city annually $1,000,000 for 35,000 electrical h.p. The amended offer is to the effect that the companies will enter into a contract with the city for the purchase of all the electrical h.p. about to be developed by the city at its proposed power house delivered at the city's substation or substations in Los Angeles in quantities as needed by the consumers upon the companies' systems, and that the companies will pay to the city therefore the sum of 65-100ths of a cent per kw-hour meter measurement. Under such a plan, and on the assumption that the average load would be about 17,500 electrical h.p., it is estimated the revenue that would be derived by the city would be approximately $750,000 annually.

TRANSPORTATION.

SEATTLE, WASH.—The city council proposes to issue additional bonds to the amount of $600,000 for extensions of the municipal car line.

OGDEN, UTAH.—The Ogden Rapid Transit Company has been granted a franchise for the construction and operation of a railroad over a certain portion of the Ogden Canyon road.

SAN FRANCISCO, CAL.—From Visalia it is reported that the route of the proposed extension of the Visalia Electric Railroad from Redbanks to Fresno has been surveyed for some distance from the present end of the line.

MEDFORD, ORE.—O. C. Boggs, attorney, here, representing the Barnum interests, has filed with the city recorder an ordinance asking for a franchise to operate an electric line in this city. A deposit of $25,000 has been made.

ALBANY, ORE.—From an authentic source comes the information that the Portland, Eugene & Eastern Railway Company will build a passenger depot here shortly. Superintendent T. L. Billingsly, of the company, will not confirm or deny the report.

RICHMOND, CAL.—The San Francisco-Oakland Terminal Railways Company has been awarded a franchise for a street car line on Ashland avenue from Macdonald avenue to the extension on Standard avenue, along Ashland avenue and from that point south to Richmond avenue.

SEATTLE, WASH.—E. M. Mills, representing bondholders and creditors of the Seattle, Renton & Southern Street Railway Company, has applied for three franchises for extension to the present system in Rainier Valley. The application has been referred to the city utilities and franchise committee.

HARLOWTOWN, MONT.—The Chicago, Milwaukee & Puget Sound Railway Company has been granted permission to electrify 450 miles of road between this city and Avery, Idaho. Power will be supplied by the Great Falls Power Company, Great Falls, Mont. It is reported work will begin at once.

ALBANY, ORE.—The Corvallis & Eastern Railway plan the following improvements to be made during the coming spring and summer: A 35x200 ft. car shop, a 24x100 ft. store room and a 20x30 ft. addition to machine shop. A large steam boiler, one or more electric motors, turning lathes, etc., will also be installed. Master Mechanic D. M. McLaughlin will have charge of the work.

SAN FRANCISCO, CAL.—By an agreement between the United Railroads and the Supervisors' finance committee relating to the percentage of receipts which the railroad should pay for secondary lines the city gained $800. Approximately $39,000 was due the city for 1911 receipts under the old arrangement, which provided that secondary lines should pay 50 per cent of what was paid for primary lines.

BURLINGAME, CAL.—F. J. Rodgers, manager of the electric railway project headed by A. M. Easton, states that if the line now under construction proves a success applications will be made to the city trustees of Burlingame for more franchises. Work on three miles of railroad was commenced several days ago. The type of car to be used on the new line is the Edison-Beach storage battery car. Mr. Rodgers says that a 15 minute service will be maintained on the new railway.

SALT LAKE CITY, UTAH.—Extensive purchases of property on West Temple, First West and Pierpont streets, have been made for the Bamberger and the Orem interests, controlling the Salt Lake and Ogden Railway and the projected Salt Lake and Utah Railway. The purchases have been made largely for the purpose of providing terminal facilities for the two electric lines, which are planning a joint depot at West Temple and Pierpont streets. The line of the Salt Lake and Ogden Railway will be extended either from its present terminus at Third West and South Temple streets, or from another point farther north to Pierpont and First West streets, and will run on Pierpont street through the block to W. Temple street, looping around the corner on W. Temple to Second South. The Salt Lake & Utah Railway, the southern terminus of which will be Payson, will enter Salt Lake in the western part of the city, coming along First West street from the south to Pierpont street, where its cars will use the same tracks as those used by the trains of the Salt Lake and Ogden Railway. Plans contemplate the looping of the Salt Lake and Utah Railway south on W. Temple street to Third South and thence west again. The property purchased jointly by the two railroads includes the Menzies property on W. Temple street between the Dooly block and Pierpont street.

TELEPHONE AND TELEGRAPH.

BURLINGTON, WASH.—The Independent Telephone Company is planning on improving its service here. Work will begin shortly.

SEATTLE, WASH.—The city council has an ordinance before it for a bond issue of $2,000,000 for a municipal telephone system.

ALPINE, TEXAS.—The Pecos & Rio Grande Telephone Company is preparing to install a direct copper line to Marfa. They also expect to put all the Alpine phones on a metallic circuit.

VICTORIA, B. C.—The British Columbia Telephone Company will extend a new line from this city to Nanaimo. The cost is approximately $15,000. C. F. Bollschweler, here, is superintendent of construction.

CENTRALIA, WASH.—The U. S. government has been granted a franchise by the Lewis county commissioners for a telephone line from Lake Creek to Randle, a distance of 25 miles. The line will be used by the forestry service.

CENTRALIA, WASH.—The county commissioners have granted a telephone franchise to the Cougar Flats Telephone Company, Wm. Booth, president. The line will be connected with rural lines in eastern Lewis county and will be built at once.

LOS ANGELES, CAL.—Bids will be received up to February 18th, for a franchise granting the right to erect and maintain poles, wires, appliances and conduits for the transmission of electricity for telephone and telegraph purposes in Vernon, Cal.

SAN ANDREAS, CAL.—Application has been made for a franchise to maintain a telephone, telegraph and electric power line from the city of Angels to the home and mining claim of Desire Fricot in Calaveras county. Sealed bids will be received up to March 3 for the sale of the franchise.

SAN DIEGO, CAL.—The Pacific Telephone & Telegraph Company is planning to erect a $40,000 substation on University avenue, between Sixth and Seventh streets. According to J. E. Franklin, local manager of the company, the new station will entail an outlay of approximately $138,000.

BAKERSFIELD, CAL.—Application has been made for a franchise granting the right for a period of 50 years to operate and maintain a pole and wire line for telephone purposes along certain public roads in Kern county. Sealed bids will be received up to February 10th for the sale of the franchise.

BISBEE, ARIZ.—Under supervision of Forest Ranger MacBeth, the United States government is building a telephone line into Patagonia from Temporal Gulch, which will connect the Mountain States line at Arivaca. Steps are under way to connect up a loop from Duquesne to Mowry, a distance of five miles, which will give Patagonia another outlet by way of Nogales.

LOS ANGELES, CAL.—Announcement has been made that the Pacific Telephone & Telegraph Company will acquire the Imperial Valley Telephone Company, negotiations having been under way for some time. After the deal is completed, the Imperial Valley Telephone Company's lines will be placed under the jurisdiction of the Pacific company. The company has about 1000 phones.

LA GRANDE, ORE.—Asserting that the rates charged by the Eastern Oregon Co-Operative Telephone Association, of Elgin, since its organization about a year ago, are unjust to competitors, discriminatory as to some of its subscribers and preferential as to others, entirely insufficient to meet its operating expenses, and that if it is allowed to continue its present rates and practices, the entire telephone industry in the local and neighboring communities will be demoralized, the Home Independent Telephone Company of La Grande has filed a lengthy complaint with the Railroad Commission of Oregon.

PORTLAND, ORE.—The government is taking an interest in the effort of the Pacific Telephone & Telegraph Company to acquire the Northwestern Long Distance Telephone Company of Oregon and Washington, under foreclosure proceedings recently commenced in Portland. When the foreclosure suit was brought complaint was made through the United States district attorney at Portland to the Washington officials that the Pacific company was seeking a monopoly of the telephone business in California, Oregon and Washington. It was shown that the Home Telephone Company of Tacoma and Bellingham and the Independent Telephone Company of Seattle, already had been acquired. The government now is seeking to ascertain whether there is evidence of restraint of trade in these combinations.

ALPHABETICAL INDEX TO ADVERTISERS

Bonestell & Company 8
Bridgeport Brass Company 4
Century Electric Company 1
Crocker-Wheeler Company 12
Cutler-Hammer Manufacturing Company 17
Dearborn Drug & Chemical Works 8
Fort Wayne Electric Works 15
General Electric Company 16
Hemingray Glass Company 12
Hughes & Company, E. C. 8
Hunt, Mirk & Company 6
Indiana Rubber & Insulated Wire Company .....
Johns-Manville Company, H. W. .....
Kellogg Switchboard & Supply Company .....
Kelman Electric Company 4
Klein & Sons, Mathias 18
Leahy Manufacturing Company 8
Locke Insulator Manufacturing Company 4
Manhattan Electrical Supply Company 1
McGlauflin Manufacturing Company 8
National Electric Lamp Association .....
Okonite Company 18
Pacific States Electric Company 2
Packard Lamp Works 12
Pelton Water Wheel Company 12
Pierson, Roeding & Company 4
Pittsburg High Voltage Insulator Company, The 18
Pittsburg Piping & Equipment Company 18
Simplex Electric Heating Company 18
Southern Pacific Company 13
Sprague Electric Works 8
Standard Underground Cable Company 18
Western Electric Company 12
Westinghouse Machine Company 6
Westinghouse Electric & Manufacturing Company .....
Weston Electrical Instrument Company 3

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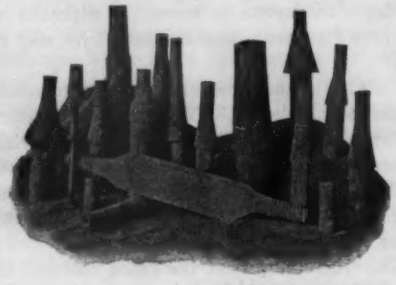
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